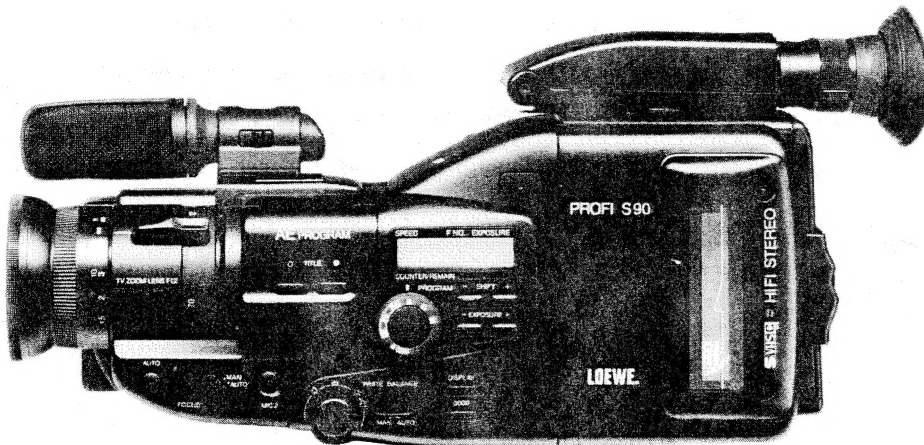


LOEWE.

Kundendienst- Serviceanleitung

(Service Manual)



SAFETY PRECAUTION

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety related characteristics, always use genuine LOEWE replacement parts.
Especially critical parts in the power circuit block should not be replaced with other makers. Critical parts are marked with Δ in the circuit diagram and printed wiring board.
2. Before returning a repaired unit to the customer, the service technician must thoroughly test the unit to ascertain that it is completely safe to operate without danger of electrical shock.

SICHERHEITSMASSNAHMEN

Bei Wartungsarbeiten sind die folgenden Sicherheitsmaßnahmen zu beachten:

1. Da verschiedene Teile dieses Gerätes Sicherheitsfunktionen aufweisen, nur Original-LOEWE-Ersatzteile verwenden.
Kritische Teile im Netzteil sollten nicht durch ähnliche Teile anderer Hersteller ersetzt werden. Alle kritischen Teile sind im Schaltplan und im Diagramm der Schaltplatinen mit dem Symbol Δ gekennzeichnet.
2. Vor der Auslieferung eines reparierten Gerätes an den Kunden muß der Wartungstechniker das Gerät einer gründlichen Prüfung unterziehen, um sicherzustellen, daß sicherer Betrieb ohne die Gefahr von elektrischen Schlägen gewährleistet ist.

230-90165.900

**LOEWE-
Camcorder
Profi S 90
Art.-Nr. 68590**

Loewe Opta GmbH.
Industriestraße 11. Postfach 220.
D-8640 Kronach.
Telefon (0 92 61) 990. Telex 642 620.
Telefax 0 92 61/9 94 13
Telegramm loewevideo.
Bildschirmtext *50 705 # (Info).
*50 705990 # (ET-Best.).

CONTENTS

CHAPTER 1

IDENTIFICATION AND OPERATION

OF CONTROLS	1-1
-------------------	-----

CHAPTER 2

DISASSEMBLY

1. CASE REMOVAL	2-1
1-1. Grip Cover	2-1
1-2. Electronic Viewfinder (EVF) ..	2-1
1-3. Accessory Shoe	2-2
1-4. Cassette Lid	2-2
1-5. Microphone	2-2
1-6. Right Case	2-2
1-7. Front Cover	2-3
1-8. Left Case	2-3
2. CIRCUIT BOARD/TAPE TRANSPORT MECHANISM REMOVAL	2-4
2-1. LCD Unit	2-4
2-2. Function Switch	2-4
2-3. Battery Jack Circuit Board (IC401)	2-4
2-4. Autofocus Circuit Board	2-4
2-5. Zoom Switch	2-5
2-6. Luma/Chroma Circuit Board	2-5
2-7. Control Circuit Board	2-5
2-8. Process Circuit Board	2-6
2-9. Sensor Circuit Board	2-6
2-10. Titler Circuit Board	2-7
2-11. DC-DC Converter	2-7
2-12. Main Circuit Board	2-7
2-13. Preamp Circuit Board	2-7
2-14. Tape Transport Mechanism	2-8
MAIN MECHANICAL COMPONENTS IDENTIFICATIONS (TOP VIEW)	2-8
MAIN MECHANICAL COMPONENTS IDENTIFICATIONS (BOTTOM VIEW)	2-9
3. MAIN MECHANICAL COMPONENTS REMOVAL	2-9
3-1. Cassette Holder and S-VHS Tape Switch	2-9
3-2. Cylinder (Upper Cylinder/ Lower Cylinder) and FM Audio Circuit Board	2-10
3-3. Audio/Control (A/C) Head	2-10
3-4. End Sensor	2-11
3-5. Cassette Holder Switch	2-11
3-6. Dew Sensor	2-11
3-7. Motor Drive Circuit Board (Safety Tab Switch, Supply Reel Sensor, End Lamp)	2-11
3-8. Mechanism State Switch	2-12
3-9. Loading Motor	2-12
3-10. Capstan Motor (Take-up Reel Sensor, Capstan FG Sensor) ...	2-12
3-11. Impedance Roller	2-12
3-12. Take-up Guide Pole	2-13
3-13. Supply Guide Roller	2-13
3-14. Take-up Guide Roller	2-13
3-15. Take-up Brake	2-14
3-16. Supply Reel Disk	2-14
3-17. Take-up Reel Gear	2-14
3-18. Take-up Gear	2-14
3-19. Tension Arm and Tension Band	2-15
3-20. Centre Gear Block	2-15
3-21. A/C Head Arm	2-15
3-22. Middle Guide Arm	2-15
3-23. Pressure Roller	2-16
3-24. Supply Guide Roller Base	2-16
3-25. Take-up Guide Roller Base	2-16
3-26. Supply Guide Roller Rail	2-16
3-27. Loading Gear Block	2-17
3-28. Take-up Loading Ring Holders (1)/(2)	2-17

3-29. Supply Loading Ring Holder ...	2-17
3-30. Take-up Guide Roller Rail	2-18
3-31. Loading Gear (2)	2-18
3-32. Supply Loading Ring	2-18
3-33. Take-up Loading Ring	2-18
3-34. Catcher Block and Full Erase (FE) Head	2-19
3-35. Cylinder Base	2-19
3-36. Synchro Gear	2-19
3-37. Pressure Roller Arm and Pressure Roller Control Arm	2-20
4. LENS BLOCK REMOVAL	2-20
4-1. Lens Block	2-20
4-2. Zoom Motor	2-20
4-3. Focus Motor	2-21
4-4. Iris Motor	2-21
5. ELECTRONIC VIEWFINDER (EVF) REMOVAL	2-21
5-1. Bottom Case	2-21
5-2. Top Case	2-21
5-3. Electronic Viewfinder (EVF) Circuit Board	2-22
5-4. CRT	2-22

6. TABLE OF FLAT PACKAGE ICS, /SOLDERING IRON TIPS	2-22
---	------

JIGS AND TAPES FOR ADJUSTMENT	3-1
-------------------------------------	-----

CHAPTER 3 MECHANICAL ADJUSTMENT

1. PHASE MATCHING OF TAKE-UP/SUPPLY LOADING RINGS AND LOADING GEAR BLOCK IN ASSEMBLY	3-1
2. MECHANISM STATE SWITCH PHASE MATCHING IN ASSEMBLY	3-2
3. CONFIRMATION OF UNLOADING POSITION	3-2
4. MIDDLE GUIDE ARM ASSEMBLING PHASE MATCHING	3-3
5. TAPE TRANSPORT SYSTEM COMPONENTS CHECK/ADJUSTMENT	3-3
5-1. TENSION POLE POSITION ADJUSTMENT/TENSION ADJUSTMENT	3-3
5-2. TAKE-UP GUIDE POLE HEIGHT ADJUSTMENT	3-3
5-3. GUIDE ROLLER HEIGHT ADJUSTMENT	3-4
5-4. A/C HEAD ADJUSTMENT	3-4
6. ADJUSTMENT AFTER REPLACING CYLINDER (VIDEO HEADS)	3-5
7. TORQUE CONFIRMATION	3-6
7-1. TAKE-UP TORQUE CONFIRMATION ..	3-6
7-2. REVERSE-SEARCH TORQUE CONFIRMATION	3-6
7-3. REVERSE-SEARCH BRAKE TORQUE CONFIRMATION	3-6

CHAPTER 4 ELECTRICAL ADJUSTMENT

1. CONNECTIONS FOR ADJUSTMENT	4-1
2. CAMERA SECTION ADJUSTMENT	4-1
2-1. CIRCUIT BOARD LOCATIONS AND SERVICING POSITION	4-1
2-2. TEST EQUIPMENT AND CHARTS NECESSARY FOR ADJUSTMENT	4-1
2-3. ADJUSTMENT CONDITIONS	4-1
2-4. PRESET POSITIONS OF SWITCHES AND CONTROLS DURING ADJUSTMENT	4-1
2-5. LIST OF CHARTS FOR CAMERA ADJUSTMENT	4-2

2-6. CAMERA ADJUSTMENT	4-2
1) Subcarrier Frequency Adjustment	4-2
2) VCO Lock Adjustment	4-2
3) Drive Pulse Frequency Adjustment	4-2
4) Sensor Sub Voltage Adjustment	4-2
5) Professional AE Adjustment ...	4-2
6) Backfocus Adjustment	4-3
7) Luminance Setup Adjustment ...	4-3
8) AIC Level Adjustment	4-3
9) Matrix Adjustment	4-4
10) White Balance Control Position Adjustment	4-4
11) Black Balance Adjustment	4-4
12) White Balance Adjustment	4-4
13) Burst Level Adjustment	4-5
14) Auto White Balance Adjustment	4-5
15) Chroma Level Adjustment	4-5
2-7. ELECTRONIC VIEWFINDER (EVF) ADJUSTMENT	4-5
1) Deflection Yoke Position Adjustment	4-5
2) EVF Centring Adjustment	4-6
3) EVF Vertical Size Adjustment	4-6
4) EVF Brightness Adjustment	4-6
5) EVF Focus Adjustment	4-6
2-8. AUTOFOCUS ADJUSTMENT	4-6
1) Sensor Position Adjustment ...	4-6
2-9. ADJUSTMENT USING THE VECTORSCOPE	4-7
2-10. ADJUSTMENT COMPONENTS LOCATIONS	4-7
3. VTR SECTION ADJUSTMENT	4-8
3-1. CIRCUIT BOARD LOCATION AND SERVICING POSITION	4-8
3-2. TEST EQUIPMENT AND ALIGNMENT TAPES NECESSARY FOR ADJUSTMENT	4-9
3-3. ADJUSTMENT CONDITIONS	4-9
3-4. PRESET POSITIONS OF SWITCHES AND CONTROLS DURING ADJUSTMENT	4-9
3-5. SYSTEM CONTROL SECTION	4-9
1) Display Position Adjustment	4-9
3-6. SERVO SECTION	4-9
1) Head Switching Point Adjustment	4-9
2) Tracking Preset Adjustment ...	4-9
3-7. LUMA/CHROMA SECTION	4-10
1) Record Luma/Chroma Level Adjustment	4-10
2) LH Delay Line Output Level Adjustment	4-10
3-8. AUDIO SECTION	4-11
1) Audio Bias Level Adjustment	4-11
2) Record FM Audio Level Adjustment	4-11
3-9. ADJUSTMENT COMPONENTS LOCATIONS	4-11

CHAPTER 5 SCHEMATIC DIAGRAMS AND CIRCUIT BOARD DIAGRAMS

WHEN USING THIS SERVICE REFERENCE

MATERIAL	5-1
LEADLESS COMPONENT IDENTIFICATION ..	5-2
CIRCUIT BOARD CONNECTION DIAGRAM ...	5-5

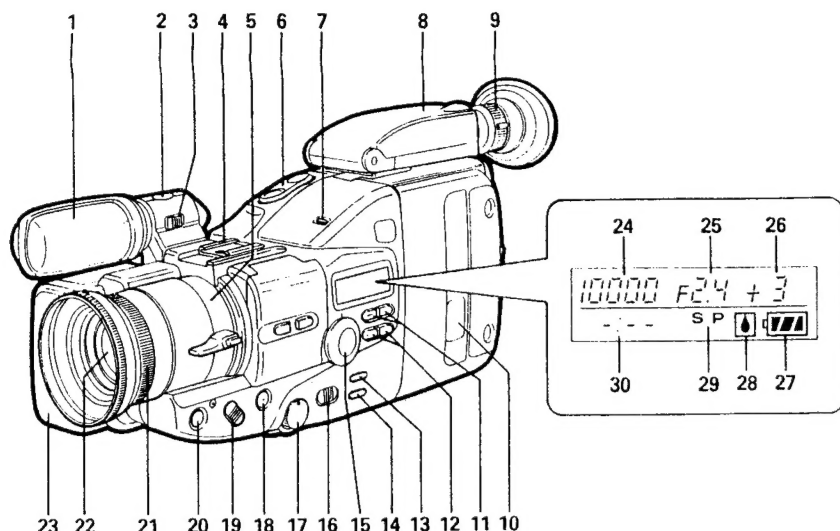
	SCHEMATIC DIAGRAM	CIRCUIT BOARD
SENSOR	5-7	/ 5-9,10
PROCESS (PROCESS)	5-11	/ 5-13
PROCESS (ENCODER)	5-15	/ 5-13
TITLER	5-17	/ 5-16
CONTROL	5-19	/ 5-19
ELECTRONIC VIEWFINDER (EVF)	5-19	/ 5-20
FOCUS SENSOR	5-21	/ 5-21
LED	5-22	/ 5-21
AUTOFOCUS	5-22	/ 5-22
MAIN (SYSTEM CONTROL)	5-23	/5-27,29
MAIN (SERVO)	5-23	/5-27,29
MAIN (REGULATOR)	5-27	/5-27,29
FUNCTION SWITCH	5-27	
MAIN (AUDIO)	5-31	/5-27,29
PREAMP	5-33	/ 5-33
LUMINANCE/CHROMA (LUMINANCE)	5-35	/5-39,41
LUMINANCE/CHROMA (CHROMA)	5-37	/5-39,41
MOTOR DRIVE (MOTOR DRIVE)	5-43	/ 5-44
MOTOR DRIVE (TROUBLE DET.)	5-45	/ 5-44
CAPSTAN MOTOR	5-45	
DC-DC CONVERTER	5-46	
SWITCHING REGULATOR	5-46	/ 5-46
FM AUDIO	5-47	/ 5-48
MIC	5-48	
WAVEFORMS		
SENSOR	5-9	
PROCESS	5-12	
ELECTRONIC VIEWFINDER (EVF)	5-24	
MAIN (SERVO)	5-32	
PREAMP	5-42	
LUMINANCE/CHROMA	5-44	

CHAPTER 6 EXPLODED VIEWS

CABINET SECTION	6-1
CHASSIS SECTION	6-2
LUBRICATION	6-2
ELECTRONIC VIEWFINDER (EVF) SECTION	6-3
LENS SECTION	6-3

CHAPTER 7

REPLACEMENT PARTS LIST	7-1
------------------------------	-----



1. Stereo Microphone

Sensitive to sounds coming from the direction in which the camera is pointed.

2. 60 Hz Detection Sensor

When a subject is shot under fluorescent lighting in areas where the power frequency is 60 Hz (in U.S.A., Canada, etc.) flickering occurs in the picture.

When this sensor detects 60 Hz, it changes the shutter speed automatically so that no flickering occurs.

NOTE: When a subject is shot under fluorescent lighting in areas where the power frequency is 50 Hz, the shutter speed is set to 1/50 automatically.

3. MIC NORMAL/WIND Switch

This switch is used to reduce noise that occurs due to wind. Place the switch in the "NORMAL" position for normal use.

4. Accessory Shoe

Used to attach a light weight video accessory to your camera/recorder.

NOTE: Do not use this shoe to mount a camera light on the camera/recorder. Excessive heat from a light could damage the camera/recorder's case.

5. Zoom Ring (Manual Zooming)

The picture also can be magnified 2 times with the use of the zoom feature. Just rotate the zoom ring for a close up (T) or wide angle (W) picture. Macro close-up, as close as 1 cm from object, is feasible.

6. Power Zoom Switch

This switch performs zooming electrically.

"W": Picture becomes wider gradually.

"T": Picture becomes telescopic gradually.

7. Record Indicator

Flashes for about 10 seconds when the SELF TIMER switch is pressed during record/pause (stand-by) mode and stays on to indicate recording starts. This also lights during normal recording.

8. Electronic Viewfinder (EVF)

Displays what the camera/recorder lens sees. The electronic viewfinder also functions as a convenient black-and-white monitor during playback of recorded material.

9. Diopter Control

To use the electronic viewfinder without eyeglasses on, turn this control knob for your optimum focus adjustment.

10. Cassette Holder

Slide EJECT switch to open the cassette holder.

Be aware of the cassette direction when inserting. **NOTE:** Power source must be connected to open the cassette holder.

11. SHIFT Buttons (▲, ▼)

When the MODE selector is set to "S", "D" or "M", use these buttons to set the shutter speed and F number.

12. EXPOSURE Buttons (+, -)

Use these buttons to correct the exposure. When the MODE selector is set to "M", press these buttons to set the shutter speed.

13. TAPE REMAIN/COUNTER Select Button

Use this button to switch the indications in the viewfinder and LCD panel.

Pressing this button once will display the tape remaining of the cassette. Pressing twice will display the tape counter. Pressing a third time will cause counter memory mark "M" to appear. Press a fourth time to delete all displays from the viewfinder leaving the tape remaining display on the LCD panel as it is. Refer to page 30.

14. RESET Button

When the tape counter is displayed in the viewfinder, pressing this button resets the counter to "0000"

15. Shooting MODE Selector

Use this selector to select on of a number shooting modes. Set it to "AUTO" for usual shooting; the camera automatically controls the functions including the iris and focus, etc. See page 21 for details.

16. WHITE BAL Switch

When this switch is in the "AUTO" position, the colour balance is set automatically. Place the switch in "MAN" position to adjust the colour balance to suit your personal preference.

17. Manual White Balance Control

Use this control to adjust the colour balance manually. Set the WHITE BAL switch to "MAN", and while viewing colour monitor, adjust this control for a nature picture.

18. NARRATION Button

Press and hold the button while shooting; you can also record a narrative via the built-in narration microphone while the button is depressed.

19. AUTO/MAN FOCUS Switch

Set this switch to the "AUTO" position for automatic focusing, and to the "MAN" position for focusing with the focus ring.

20. PUSH AUTO Focus Button

Auto focusing can be also performed during manual focus mode by pushing this button.

21. Focus Ring

Do not attempt to manually turn the focus ring when the camera/recorder is in the auto focus mode.

22. Lens

F1.2 (8.7 - 70 mm) 8:1 power zoom lens features with auto focus and auto iris functions.

23. Auto Focus Window

To automatically focus the camera lens, this window transmits and receives infrared light which is reflected off the subject. Make sure you don't obstruct this window when recording.

24. SHUTTER SPEED Indicator

Indicates the selected shutter speed.

25. F No. Indicator

Indicates the selected F number.

26. Exposure Correction Value Indicator

27. Battery Level Indicator

Indicates the battery condition.

When the battery is fully charged, the display shows "100%". When the battery is very nearly empty, the display shows "10%". When "10%" starts blinking, you should find an alternative power source or recharge the battery.

28. Dew Indicator

Indicates dew condensation on the camera/recorder mechanism. While this indicator appears, the unit will not operate. If this occurs, eject the tape and leave the power on. When the indicator goes off, the unit can be operated.

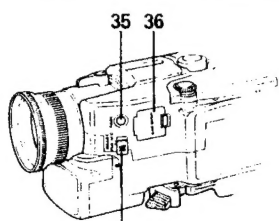
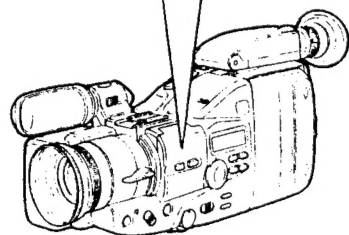
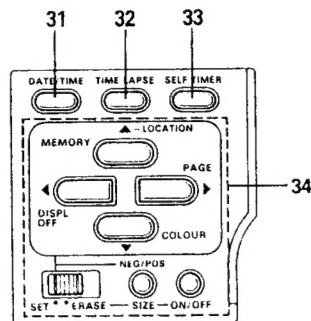
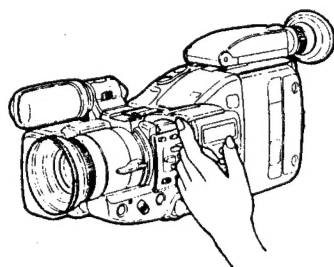
29. Tape Speed Indicator (SP/LP)

Shows the recording speed during recording and playback.

30. TAPE REMAIN/COUNTER Indicator

Shows the tape remaining or tape counter.

- Open the door as shown in the figure.



31. DATE/TIME Button

Press this button to display the date and clock in the viewfinder. Whenever the date and clock appear in the viewfinder, they will be recorded on the tape.

32. TIME LAPSE Button

This button allows time lapse and one shot recording.

33. SELF TIMER Button

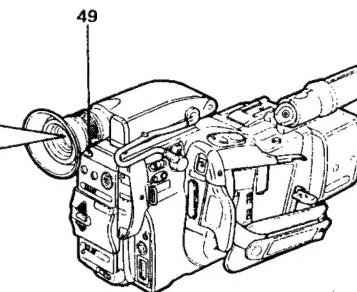
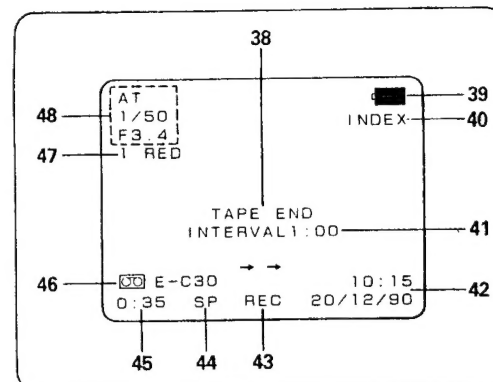
This button allows you to start recording after about 10 seconds when the button is pressed.

34. Titler Buttons

Use these buttons to store a title in memory or recall the stored title and record it superimposed on the picture being shot. See page 31 for details.

35. FADE Button

During recording you can add a professional touch to your recordings by fading in and out of scenes. **NOTE:** When you use FADE button to fade in and out, the sound will also fade in and out with the picture.



36. Clock Battery Compartment

Pull the tab to open the cover and install the clock battery (provided).

37. IMAGE Switch

Normally set it to "POS". Set to "NEG" for special effects as in a negative film.

38. TAPE Indicator

When the record start/stop button is pressed, if a cassette without its safety tab is inserted or there is no cassette, "TAPE" appears for several seconds. When the tape reaches near the end during shooting, "TAPE END" flashes.

39. Battery Level Indicator

Indicates the battery condition. When the battery is fully charged, the display shows "100%". When the battery is very nearly empty, the display shows "10%". When "10%" starts blinking, you should find an alternative power source or recharge the battery.

40. INDEX Indicator

See page 29 for details.

41. INTERVAL Indicator

Appears in the time lapse and one-shot recording modes.

42. DATE/TIME Indicator

Indicate the date/clock during the record or record/pause (stand-by) mode. You can record the clock and/or date with object when recording.

43. MODE Indicator

Indicates the operating modes;

- "REC" appears during the record mode.
- "REWIND" appears during the rewind mode.
- "FASTFWD" appears during the fast forward mode.

44. Tape Speed Indicator (SP/LP)

Shows the recording speed during recording and playback.

45. TAPE REMAIN/COUNTER Indicator

Shows the tape remaining or tape counter.

46. TAPE Indicator

- : Shows that a cassette is inserted.
- E-C30: Shows the type of cassette tape.

47. Title Indicator

Indicates the page and colour of the title.

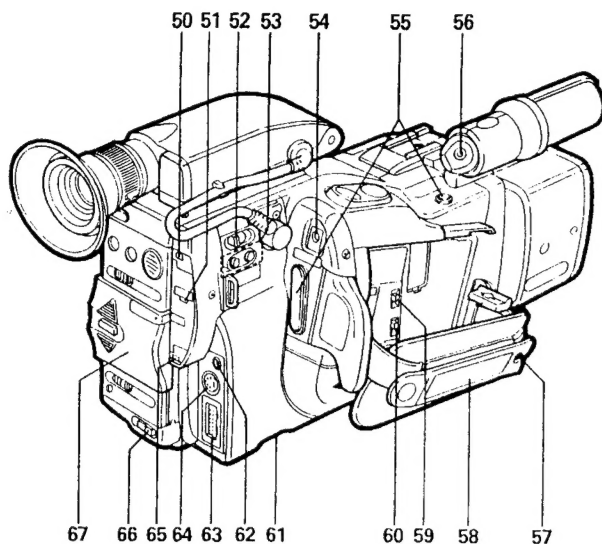
48. Shooting MODE Indicator

Indicates the shooting mode, shutter speed and F number.

49. DISPLAY Button

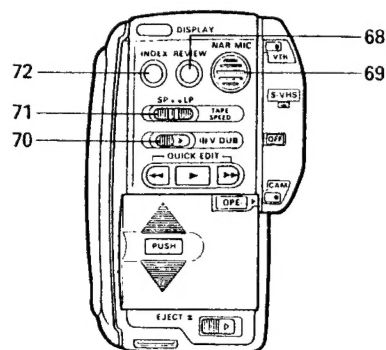
Use this button to switch the display in the viewfinder on and off. Pressing the button once will cause the display to appear in the viewfinder and pressing it once more to fix the display. Press the button a third time to delete the display from the viewfinder.

NOTE: Use the DATE/TIME button on the side panel to switch the date/time display on and off.



■ When Camera power is turned on
(the mode shifter is slid down)

■ When VTR power is turned on.
(the mode shifter is slid up)



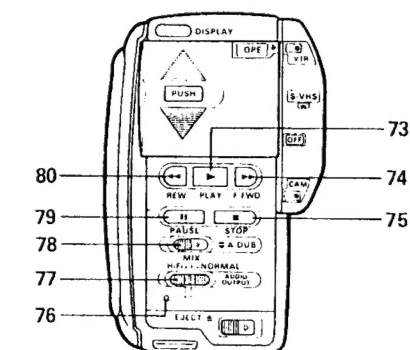
50. VTR Indicator

Lights when the VTR power is turned on.

51. S-VHS Indicator

This indicator lights up when the camera/recorder is recording or playing back in the S-VHS mode. It does not light up when the camera/recorder is recording or playing back in the VHS mode.

NOTE: An S-VHS-C cassette must be used to record in the S-VHS format.



52. MIC MIX (ON/OFF) Switch

This switch lets you add additional comments (or music) to a tape while you are copying a tape from your camera/recorder onto another VTR.

53. DATE/TIME Set Buttons

These buttons are used to set the clock (time and date) in your camera/recorder so it can be recorded on your tapes for future reference.

54. DC IN 9.6V Jack

When using the AC adapter/charger, connect one end of the DC cord (provided) to this jack and the other end to "DC OUTPUT" of the AC adapter/charger. When using the car cord (optional), connect this jack and the car's cigarette lighter socket.

55. Record Start/Stop Buttons

These two buttons function in the entirely same way. Press either button in the camera mode to start recording. Press it again to set the camera/recorder to the record/pause (standby) mode.

56. EXT. STEREO MIC Jack

Connect an external microphone (Not supplied) here to record sound from the external microphone. **NOTE:** Connecting an external microphone automatically switches off the built-in microphone.

57. Lens Cap Tab

Place the lens cap on this tab when you are ready to record a scene. The tab also prevents the lens cap from swinging around on its cord.

58. Hand Strap

Adjust to best fit to your hand.

59. S-VHS Switch

Use to select S-VHS or normal VHS for recording. It has no effect during playback. Normally set it to "AUTO". S-VHS indicator lights when the camera/recorder is recording or playing back in S-VHS mode.

60. EDIT Switch

When copying a tape onto another VTR, set this switch to "ON". The copied tape will provide clearer picture.

61. TRACKING Control

Used when playing a tape recorded on another VTR. Adjust for best picture. At all other times leave it in the center position, which can be found as a small detent in the movement of the knob.

62. HEADPHONE Jack

Sound being recorded via the microphone or played back may be monitored by stereo ear receiver (provided) connected to this jack.

63. AV OUT Jack

Connect the audio/video output cable to this jack and to the audio and video inputs of your TV/monitor receiver. You may also connect the RF converter unit to this jack and your TV receiver.

64. S VIDEO Out Jack

Use this connector jack when you want to send the video signal out to the TV or the VTR having an S VIDEO IN jack.

NOTE: This connector allows you to take full advantage of the new S-VHS recording format.

65. CAM Indicator

Will light when the camera power is turned on.

66. EJECT Switch

Slide to insert or remove the cassette.

67. Mode Shifter

Uses this mode shifter to switch the camera power and VTR power on and off.

68. REVIEW Button

Used to review the last few seconds of the recorded segment in the record/pause mode.

69. NARRATION MIC.

You can record a narrative via this microphone together with the picture and sound. The operator's voice can be recorded via this microphone while the NARRATION button is held depressed.

70. VIDEO DUB Switch

This switch is used to record new video in place of existing video without erasing the audio.

71. TAPE SPEED Switch (LP/SP)

This switch selects the recording speed. "SP" provides the best picture quality but the shortest recording time (30 minutes with E-C30 tape). "LP" provides slightly reduced picture quality, but longer recording time (1 hour with E-C30 tape). **NOTE:** Tape speed switch has no effect during playback. When playing tapes, the tape speed is selected automatically.

72. INDEX Button

When this button is pressed during a recording, the camera/recorder records an invisible index mark on the tape.

This is useful later when the tape is played back in a VTR that features the indexing system called "VHS Index Search System" because you will be able to quickly locate each index mark.

73. PLAY Button

Used for playback of tape.

NOTE: When the camera/recorder is record/pause (stand-by) mode, pressing and holding this button will play the tape at normal.

74. F.FWD Button

Press this button during stop or rewind mode, and fast-forwarding starts. "FAST FWD" indication appears in the viewfinder whenever the tape counter or time remaining is present. Press the button during playback of tape, and the tape is played back in the forward direction approximately 3 times faster than the normal speed (SP recorded tape) or 7 times faster than the normal speed (LP recorded tape) to confirm the recorded content. Press PLAY button to return to normal playback mode or press STOP button to stop tape movement.

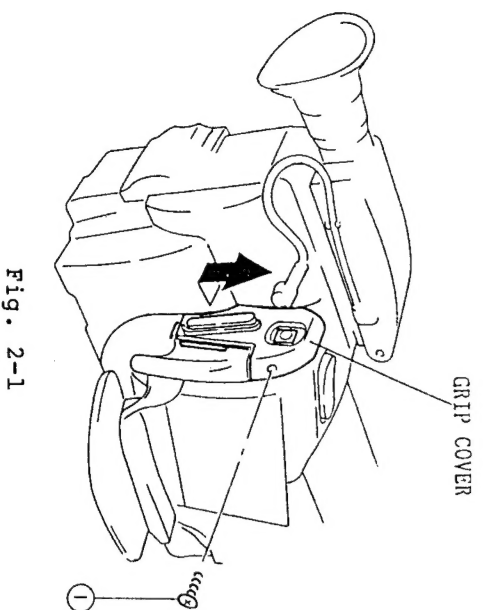
NOTE: You can also visually scan forward when the camera/recorder is record/pause (stand-by) mode by pressing and holding this button.

CHAPTER 2 DISASSEMBLY

1. CASE REMOVAL

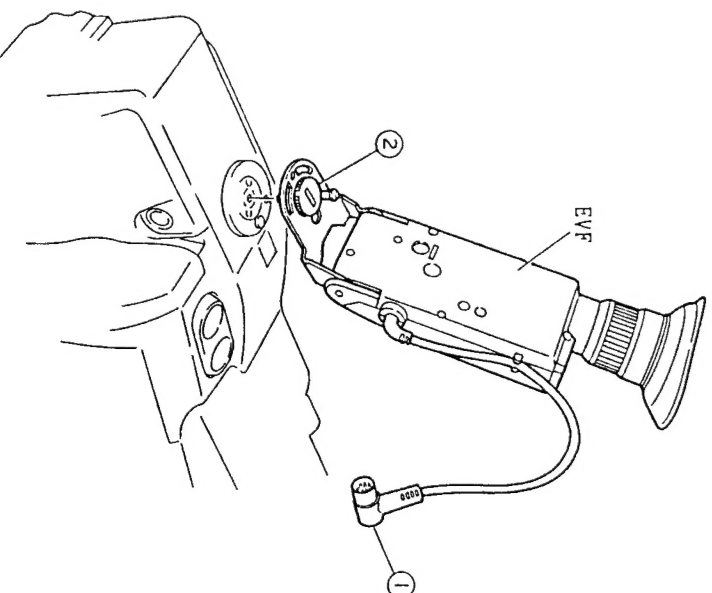
1-1. Grip Cover

1. Remove one (1) screw holding the grip cover and remove the grip cover in the direction of the arrow. (See Fig. 2-1)



1-2. Electronic Viewfinder (EVF)

1. Disconnect connector CN806. (See Fig. 2-2).
2. Remove one (1) screw holding the EVF.



79. PAUSE Button

This button is used to display a still picture during playback mode.

80. REW Button

Press this button during stop or fast forward mode, and fast-rewinding starts. "REWIND" indication appears in the viewfinder whenever the tape counter or time remaining is present. Press the button during playback of tape, and the tape is played back in the rewind direction approximately 3 times faster than the normal speed (SP recorded tape) or 7 times faster than the normal speed (LP recorded tape) to confirm the recorded contents. Press PLAY button to return to normal playback mode or press STOP button to stop tape movement.

NOTE: You can also visually scan backward when the camera/recorder is record/pause (stand-by) mode by pressing and holding this button.

75. STOP Button

The STOP button is used to stop playback, rewind, and fast forward operations. The STOP button has no effect during record operation.

76. Hi-Fi Indicator

Lights if the AUDIO OUTPUT select switch is set to "Hi-Fi" or "MIX" when a Hi-Fi recorded tape is played.

77. AUDIO OUTPUT Select Switch

Change over this switch to select the sound to be played back.

- **Hi-Fi:** Plays the stereo sound recorded on the Hi-Fi tracks.
- **MIX:** Plays the sound recorded on both the Hi-Fi and linear tracks.
- **NORMAL:** Plays the sound recorded on the linear tracks.

78. AUDIO DUB Switch

This switch is used to record new audio in place of existing audio without erasing the video.

1-3. Accessory Shoe

1. Insert a flat-bladed screwdriver, etc. into the hole in the accessory shoe spring and remove the shoe spring in the direction of the arrow. (See Fig. 2-3)
2. Remove two (2) screws holding the accessory shoe. (See Fig. 2-4)

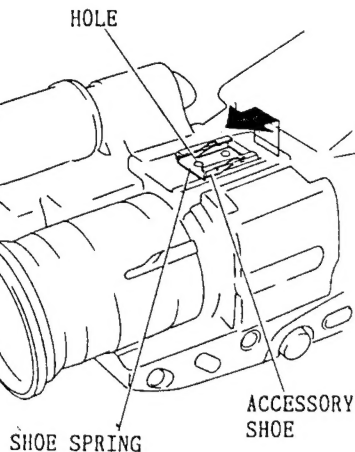


Fig. 2-3

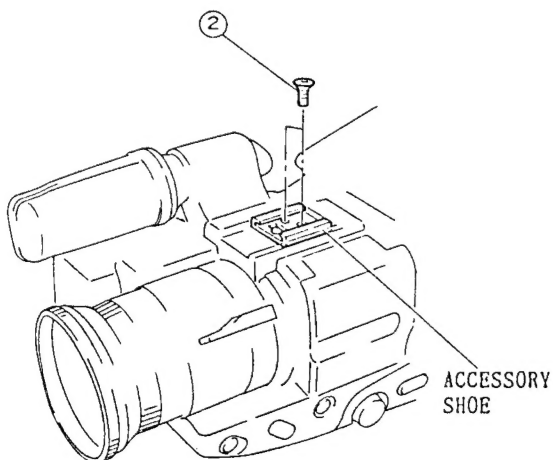
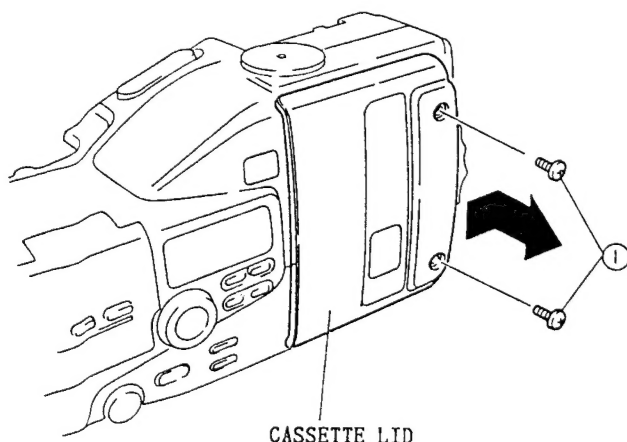


Fig. 2-4

1-4. Cassette Lid

1. Remove two (2) screws holding the cassette lid and remove the cassette lid in the direction of the arrow. (See Fig. 2-5)



CASSETTE LID

Fig. 2-5

1-5. Microphone

1. Remove one (1) screw holding the microphone and remove the microphone in the direction of the arrow. (See Fig. 2-6)
2. Disconnect two (2) connectors (CN001, CN002). (See Fig. 2-7)

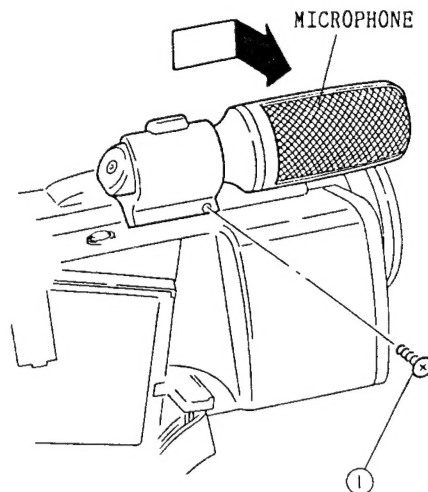


Fig. 2-6

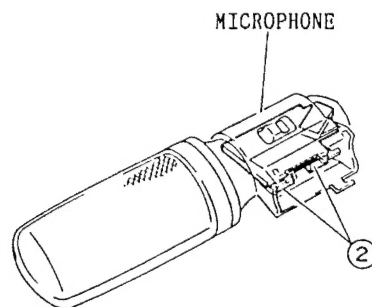


Fig. 2-7

1-6. Right Case

1. Remove the grip cover. (See Fig. 2-1)
2. Remove the EVF. (See Fig. 2-2)
3. Remove the accessory shoe. (See Figs. 2-3, 2-4)
4. Remove the microphone. (See Figs. 2-6, 2-7)
5. Remove five (5) screws holding the right case. (See Fig. 2-8)
6. Remove three (3) screws holding the right case. (See Fig. 2-9)
7. Disconnect two (2) connectors (PG1, PG2) and remove the right case in the direction of the arrow. (See Figs. 2-8, 2-9)

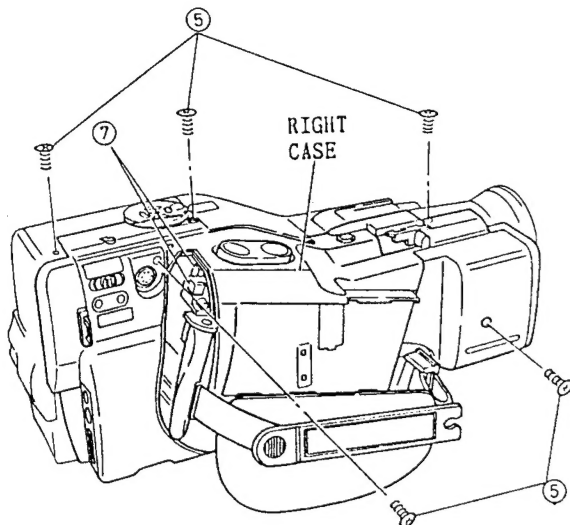


Fig. 2-8

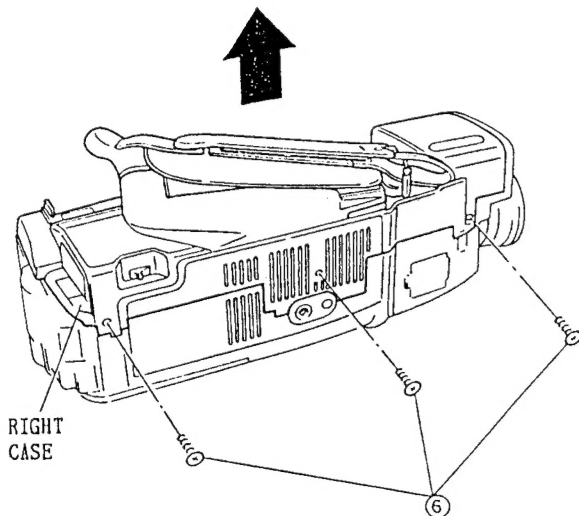


Fig. 2-9

1-7. Front Cover

1. Remove the grip cover. (See Fig. 2-1)
2. Remove the EVF. (See Fig. 2-2)
3. Remove the accessory shoe. (See Figs. 2-3, 2-4)
4. Remove the microphone. (See Figs. 2-6, 2-7)
5. Remove the right case. (See Figs. 2-8, 2-9)
6. Remove one (1) screw holding the front cover. (See Fig. 2-10)

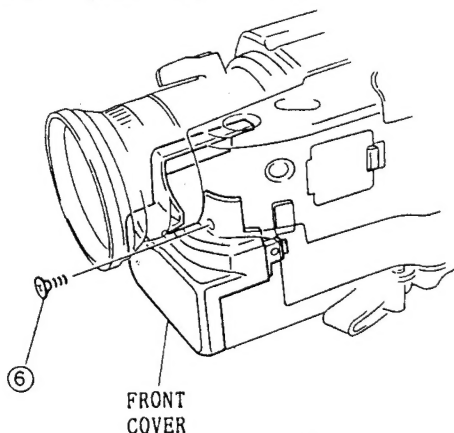


Fig. 2-10

1-8. Left Case

1. Remove the grip cover. (See Fig. 2-1)
2. Remove the EVF. (See Fig. 2-2)
3. Remove the accessory shoe. (See Figs. 2-3, 2-4)
4. Remove the cassette lid. (See Fig. 2-5)
5. Remove the microphone. (See Figs. 2-6, 2-7)
6. Remove the right case. (See Figs. 2-8, 2-9)
7. Remove the front cover. (See Fig. 2-10)
8. Remove three (3) screws holding the left case. (See Fig. 2-11)
9. Remove five (5) screws holding the left case. (See Fig. 2-12)
10. Open the luma/chroma circuit board. (See Fig. 2-20)
11. Disconnect connector CN005 on the main circuit board and remove the left case in the direction of the arrow. (See Figs. 2-12, 2-13)

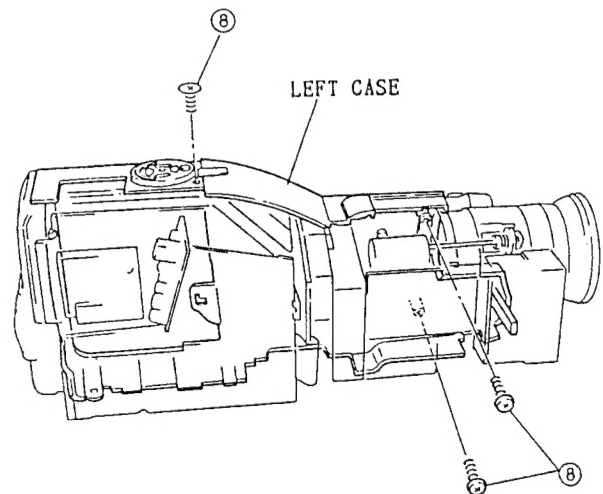


Fig. 2-11

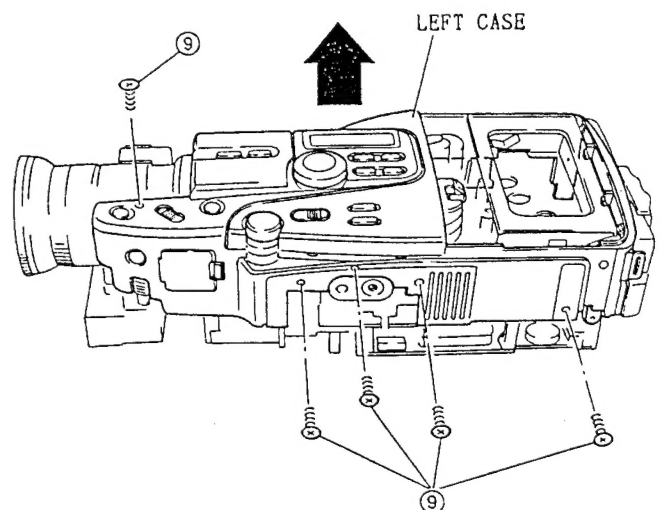


Fig. 2-12

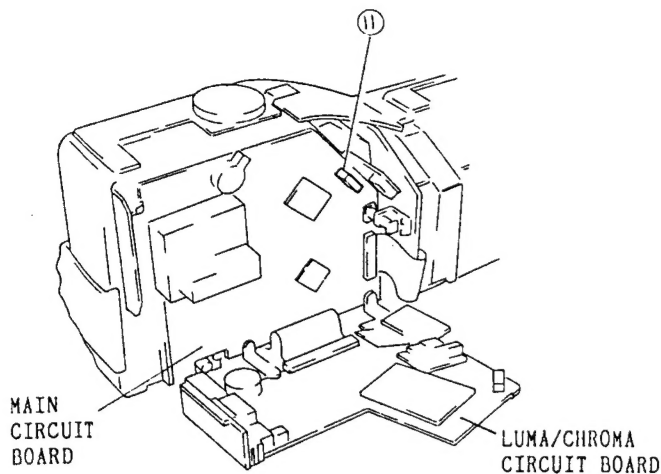


Fig. 2-13

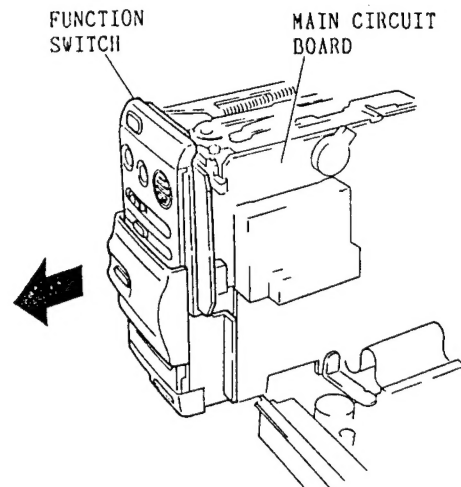


Fig. 2-15

2. CIRCUIT BOARD/TAPE TRANSPORT MECHANISM REMOVAL

Remove the right case as described previously.

2-1. LCD Unit

Remove the left case as described previously.

1. Remove one (1) screw holding the LCD unit. (See Fig. 2-14)
2. Release two (2) tabs and remove the LCD unit in the direction of the arrow.

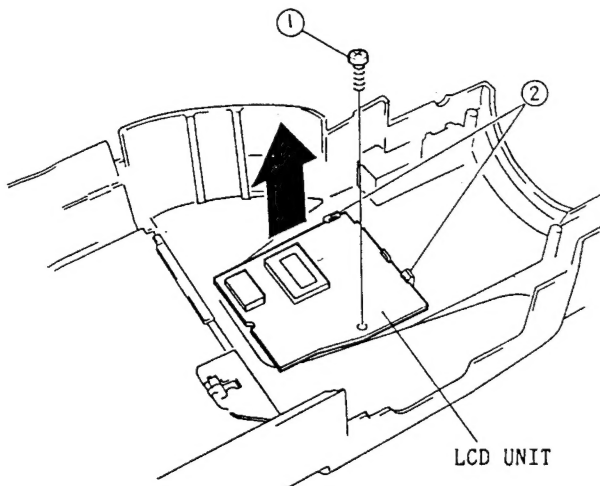


Fig. 2-14

2-2. Function Switch

Remove the left case as described previously.

1. Remove the function switch in the direction of the arrow. (See Fig. 2-15)

2-3. Battery Jack Circuit Board (IC401)

1. Pull out the battery jack circuit board (IC401) in the direction of the arrow from the main circuit board. (See Fig. 2-16)

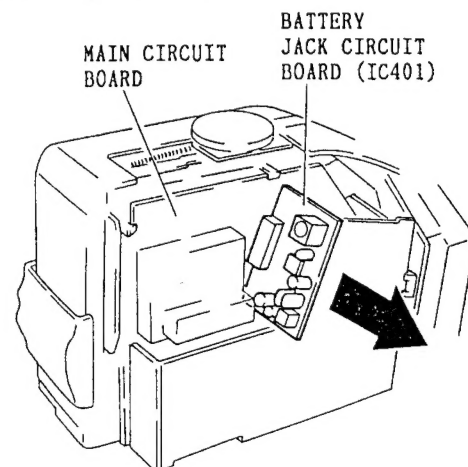


Fig. 2-16

2-4. Autofocus Circuit Board

1. Remove one (1) screw and open the autofocus circuit board in the direction of the arrow. (See Fig 2-17)
2. Disconnect four (4) connectors (CN1A, CN2A, CN3A, CN4A). (See Fig. 2-18)
3. Unsolder two (2) connectors (CN01, CN02).

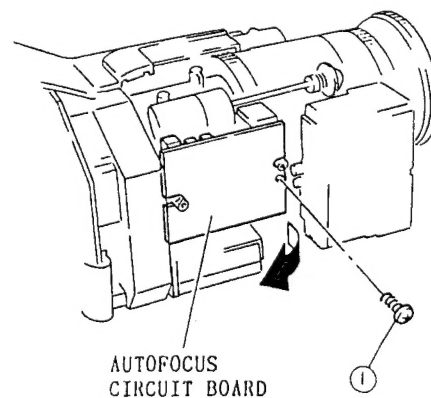


Fig. 2-17

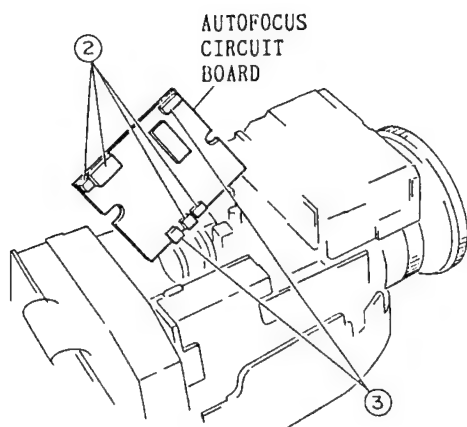


Fig. 2-18

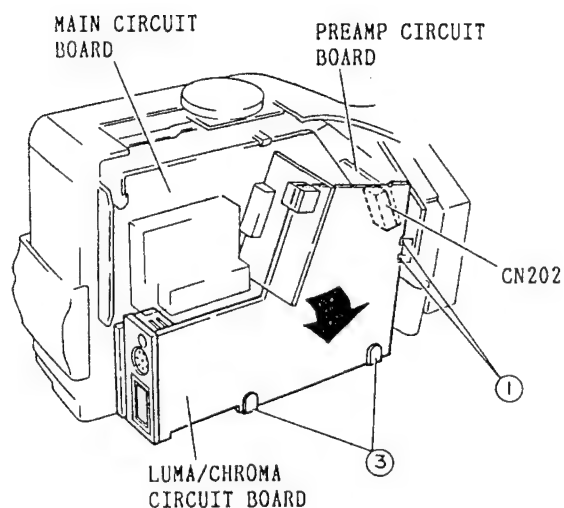


Fig. 2-20

2-5. Zoom Switch

1. Release four (4) tabs and remove the zoom switch from the right case.

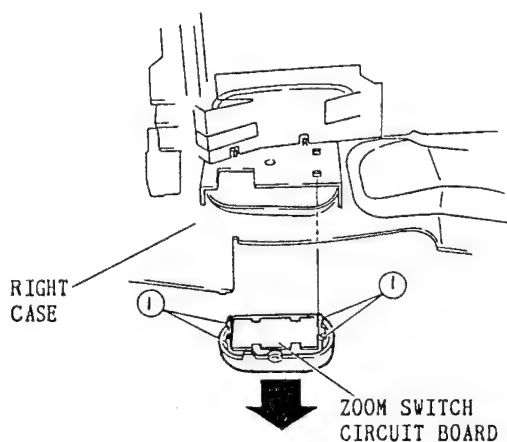


Fig. 2-19

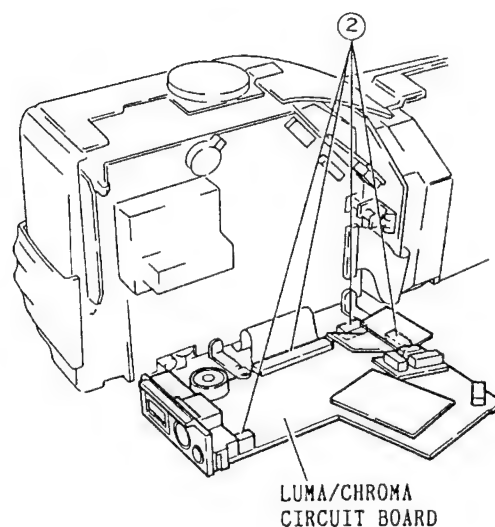


Fig. 2-21

2-6. Luma/Chroma Circuit Board

1. Release two (2) tabs, and while disconnecting connector CN202 from the preamp circuit board, open the luma/chroma circuit board in the direction of the arrow. (See Fig. 2-20)
2. Disconnect three (3) connectors (CN010, CN012, CN013) and one (1) flat cable (CN009). (See Fig. 2-21)
3. Release two (2) tabs of the circuit board holder and remove the luma/chroma circuit board. (See Fig. 2-20)

2-7. Control Circuit Board

Remove the left case as described previously.

1. Release one (1) tab, and while disconnecting connector CN403 from the titler circuit board, remove the control circuit board in the direction of the arrow. (See Fig. 2-22)
2. Disconnect two (2) connectors (CN006, CN302). (See Fig. 2-23)

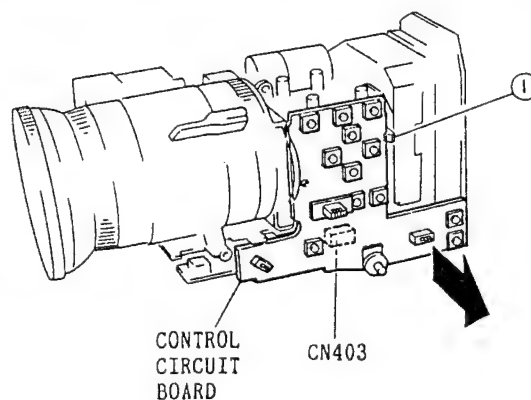


Fig. 2-22

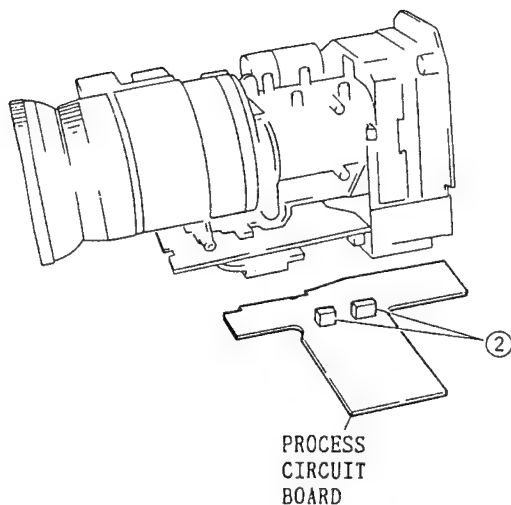


Fig. 2-23

2-8. Process Circuit Board

Remove the left case as described previously.

1. Open the luma/chroma circuit board. (See Fig. 2-20)
2. Disconnect five (5) connector (CN004, CN006, CN007, CN010, CN013) and one (1) flat cable (CN008). (See Fig. 2-24)
3. While disconnecting two (2) connectors (CN201, CN208) from the sensor circuit board, open the process circuit board in the direction of the arrow. (See Fig. 2-25)
4. Disconnect six (6) connectors (CN001, CN007, CN202, CN203, CN211, CN 401). (See Fig. 2-26)

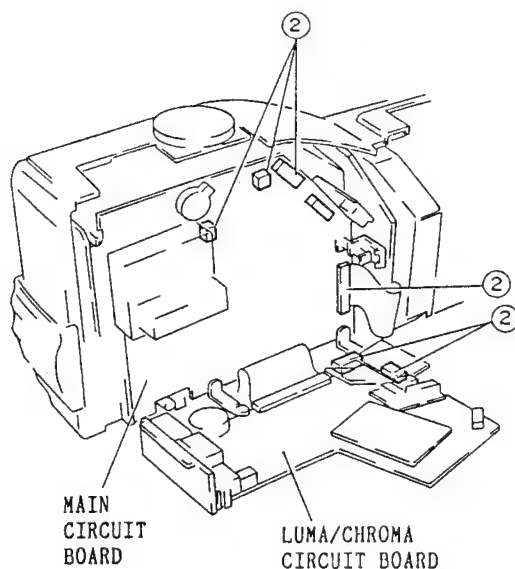


Fig. 2-24

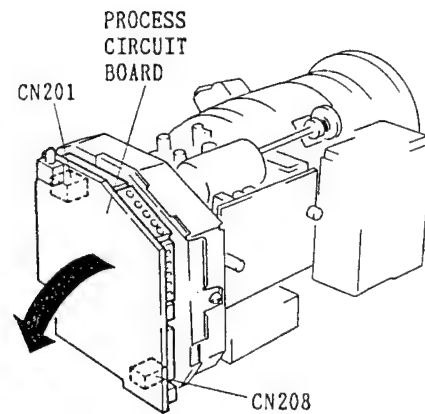


Fig. 2-25

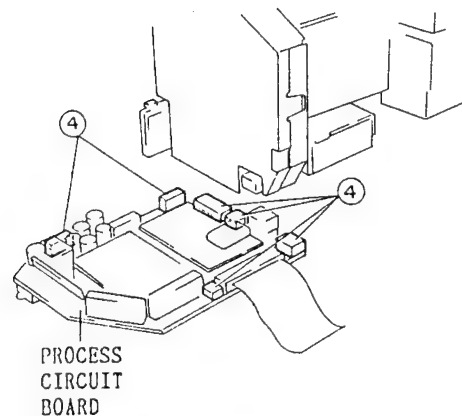


Fig. 2-26

2-9. Sensor Circuit Board

Remove the left case as described previously.

1. Open the luma/chroma circuit board. (See Fig. 2-20)
 2. Remove the process circuit board. (See Figs. 2-24, 2-25, 2-26)
 3. Remove one (1) screw holding the sensor shield cover in the direction of the arrow. (See Fig. 2-27)
 4. Remove the sensor shield cover in the direction of the arrow.
 5. Remove two (2) screws holding the sensor circuit board. (See Fig. 2-28)
- Note: When reinstalling the sensor circuit board, tighten two screws holding the sensor evenly.

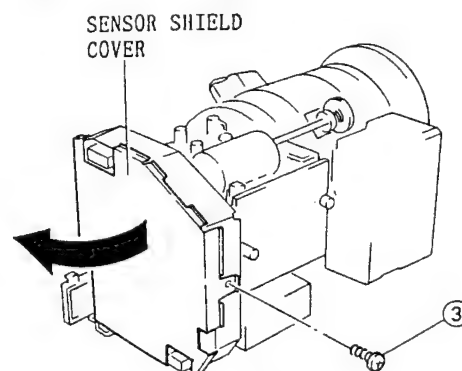
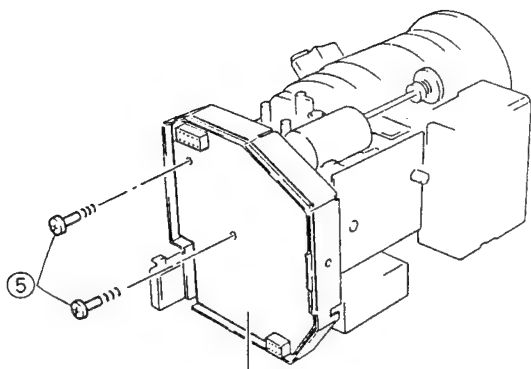


Fig. 2-27



SENSOR CIRCUIT BOARD

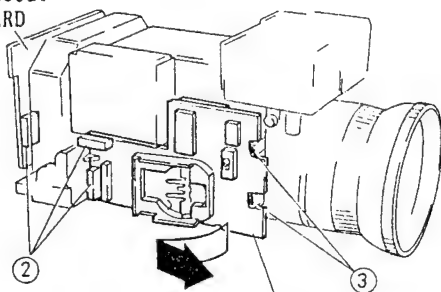
Fig. 2-28

2-10. Titler Circuit Board

Remove the left case as described previously.

1. Remove the control circuit board. (See Figs. 2-22, 2-23)
2. Disconnect three (3) connectors (CN004, CN013, CN401). (See Fig. 2-29)
3. Release two (2) tabs and remove the titler circuit board in the direction of the arrow.

PROCESS
CIRCUIT
BOARD



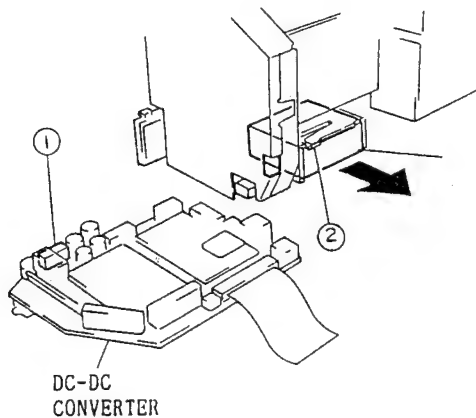
TITLER
CIRCUIT
BOARD

Fig. 2-29

2-11. DC-DC Converter

Remove the left case as described previously.

1. Disconnect connector CN206 on the process circuit board. (See Fig. 2-30)
2. Release one (1) tab and pull out the DC-DC converter in the direction of the arrow.



DC-DC
CONVERTER

Fig. 2-30

2-12. Main Circuit Board

Remove the left case as described previously.

1. Remove the battery jack circuit board (IC401). (See Fig. 2-16)
2. Open the luma/chroma circuit board. (See Fig. 2-20)
3. Pull out the function switch in the direction of the arrow from the main circuit board. (See Fig. 2-31)
4. Disconnect seven (7) connectors (CN002, CN004, CN006, CN007, CN012, CN401, CN402) and one (1) flat cable (CN804).
5. Release two (2) tabs, and while disconnecting two (2) connectors (CN501, CN801) from the motor drive circuit board and FM audio circuit board, remove the main circuit board in the direction of the arrow. (See Fig. 2-31)
8. Release two (2) tabs of the circuit board holder and remove the main circuit board.

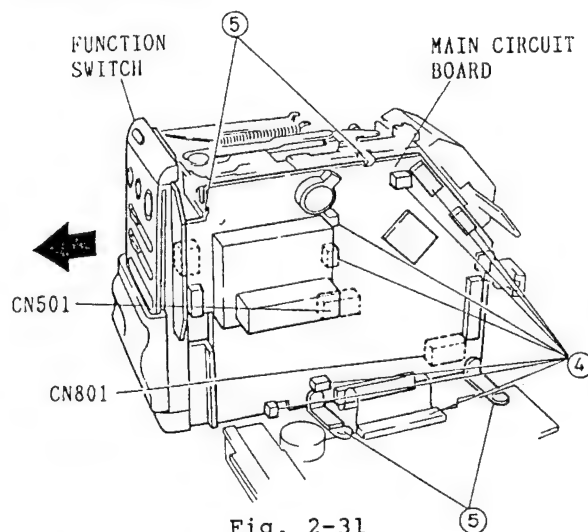


Fig. 2-31

2-13. Preamp Circuit Board

Remove the left case as described previously.

1. Open the luma/chroma circuit board. (See Fig. 2-20)
2. Release two (2) tabs and remove the preamp shield cover. (See Fig. 2-32)
3. Disconnect connector CN101.
4. Remove one (1) screw holding the preamp shield case. (See Fig. 2-33)

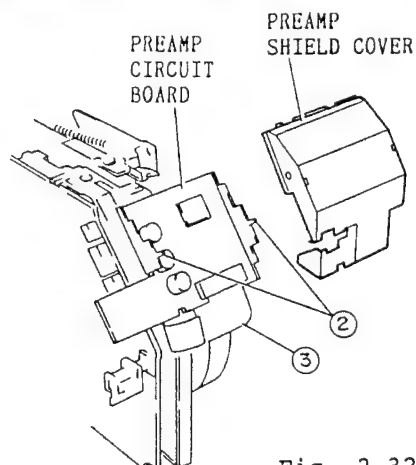


Fig. 2-32

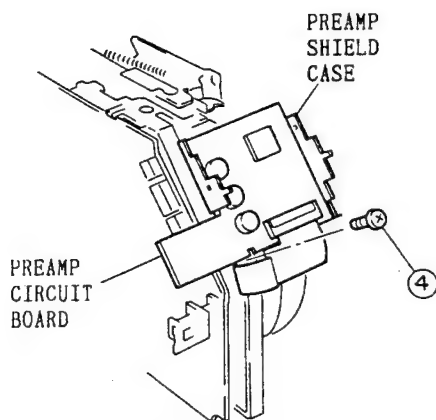


Fig. 2-33

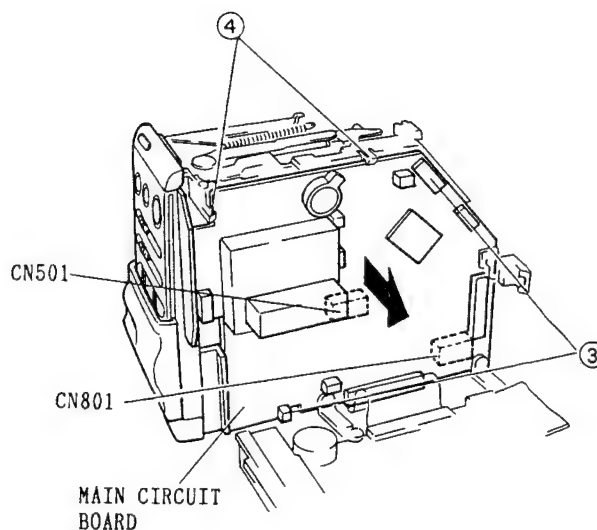


Fig. 2-34

2-14. Tape Transport Mechanism

Remove the left case as described previously.

1. Open the luma/chroma circuit board.
(See Fig. 2-19)
2. Remove the preamp circuit board.
(See Figs. 2-32, 2-33)
3. Disconnect two (2) connectors (CN401, CN402). (See Fig. 2-34)
4. Release two (2) tabs, and after disconnecting two (2) connectors (CN501, CN801) from the motor drive circuit board and FM audio circuit board, remove the main circuit board in the direction of the arrow.

MAIN MECHANICAL COMPONENTS IDENTIFICATIONS (TOP VIEW)

1. Cylinder Brush
2. Upper Cylinder
3. Take-up Guide Pole
4. Audio/Control (A/C) Head
5. Plate Spring
6. X-Value Adjustment Nut
7. Pressure Roller
8. Take-up Loading Ring
9. Middle Guide Arm
10. Take-up Reel Gear
11. Take-up Gear
12. Supply Loading Ring
13. Take-up Brake
14. Centre Gear Block
15. End Lamp
16. Take-up Guide Roller
17. Loading Gear Block
18. Tension Band
19. Supply Reel Disk
20. Safety Tab Switch
21. Loading Motor
22. Tension Arm
23. Supply Guide Roller
24. End Sensor
25. Impedance Roller
26. Full Erase (FE) Head
27. Catcher Block

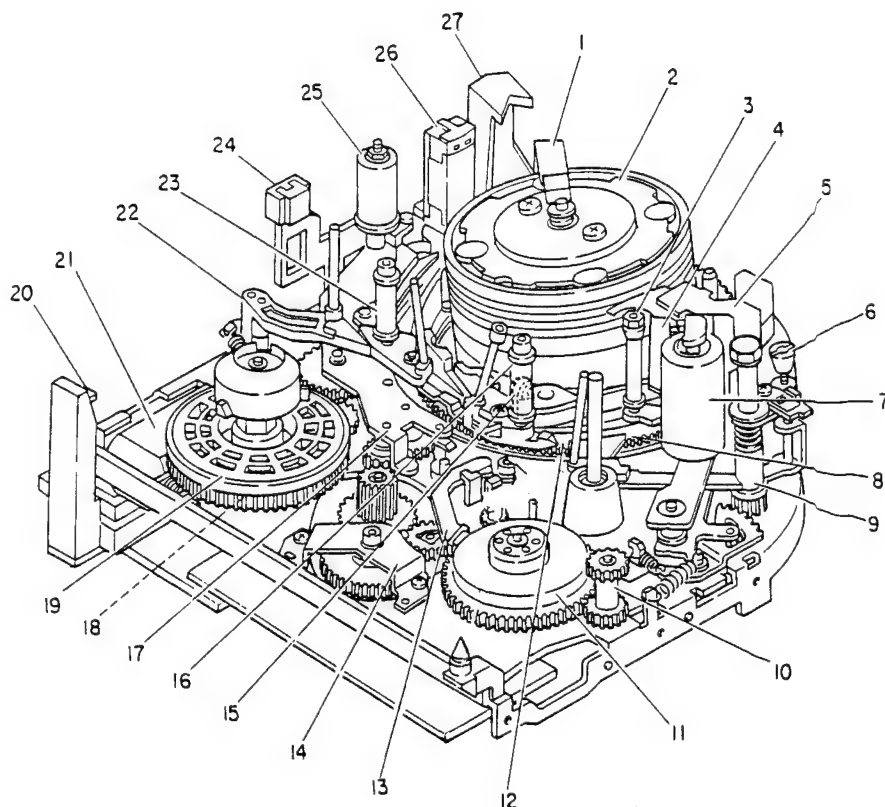


Fig. 2-35

MAIN MECHANICAL COMPONENTS IDENTIFICATIONS (BOTTOM VIEW)

1. Lower Cylinder
2. Mechanism State Switch
3. Motor Drive Circuit Board
4. Capstan Belt
5. Capstan Motor
6. FM Audio Circuit Board

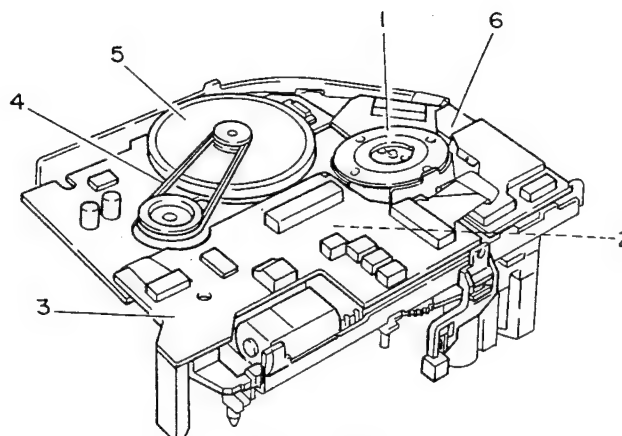


Fig. 2-36

3. MAIN MECHANICAL COMPONENTS REMOVAL

Reinstall the components by the reverse procedure to removal when no caution items are given. Remove the mechanism section as described previously.

3-1. Cassette Holder and S-VHS Tape Switch

1. Disconnect two (2) connectors (CN554, CN558) on the motor drive circuit board. (See Fig. 2-51)
2. Remove one (1) screw holding the S-VHS tape switch. (See Fig. 2-51-1)
3. Move the cassette holder lock lever in the direction of the arrow to lift up the cassette holder. (See Fig. 2-52)
4. Remove four (4) screws holding the cassette holder and remove the holder together with the holder switch from the chassis. (See Figs. 2-52, 2-53)

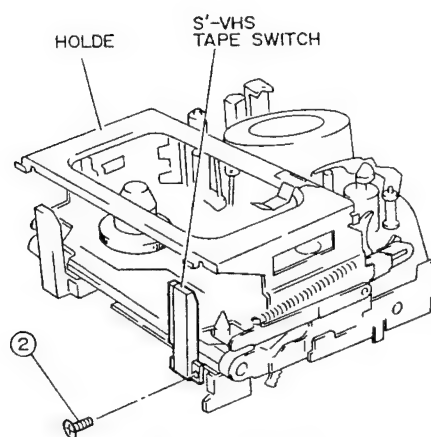


Fig. 2-51-1

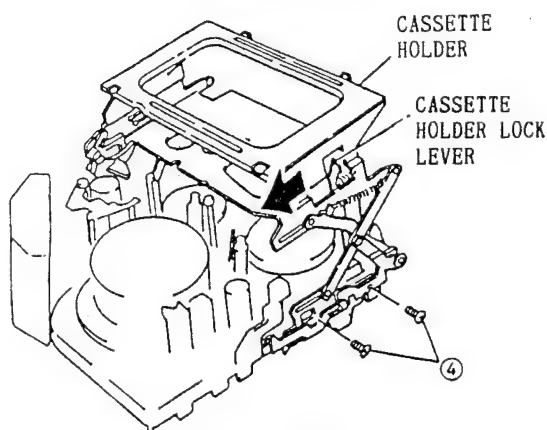


Fig. 2-52

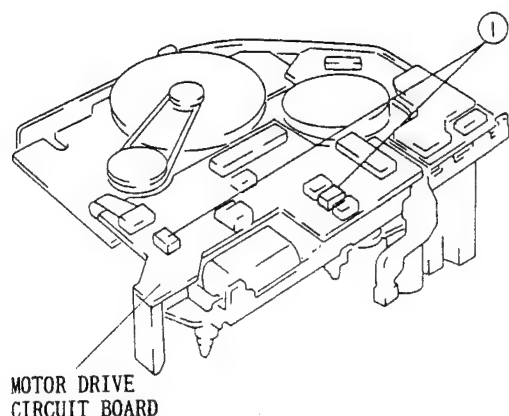


Fig. 2-51

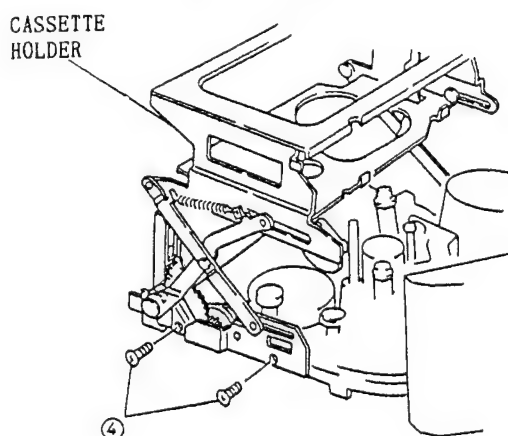


Fig. 2-53

3-2. Cylinder (Upper Cylinder/Lower Cylinder) and FM Audio Circuit Board

Upper Cylinder

1. Remove one (1) screw holding the cylinder brush. (See Fig. 2-54)
2. Remove two (2) screws holding the upper cylinder.
3. Unsolder eighteen (18) points on the upper cylinder and pull out the upper cylinder from the lower cylinder. (See Fig. 2-55)

FM Audio Circuit Board and Lower Cylinder

4. Disconnect one (1) flat cable (CN001) on the FM audio circuit board. (See Fig. 2-55-1)
5. Remove one (1) screw holding the FM audio circuit board.
6. Disconnect flat cable CN552. (See Fig. 2-55-2)
7. Remove three (3) screws holding the lower cylinder.

Note: Do not touch the video head tips with your fingers or tools during the work.

Since the upper cylinder uses connectors, pull it out at right angles to the axis of rotation of the cylinder.
Tighten the two (2) screws holding the upper cylinder evenly.
Reinstall the cylinder brush so its contact comes into contact with the center of the cylinder shaft.
Adjust as follows after installing the upper cylinder.

* CHAPTER 3

6. ADJUSTMENT AFTER REPLACING CYLINDER (VIDEO HEAD)

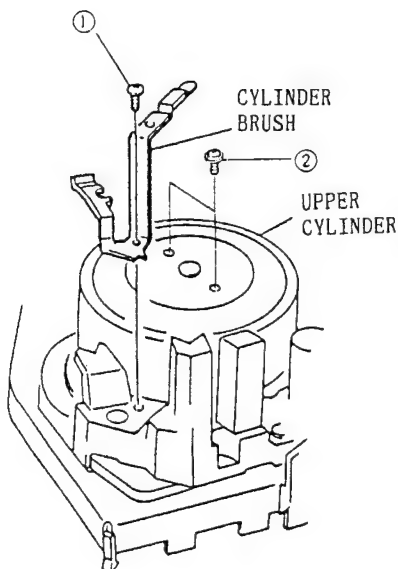


Fig. 2-54

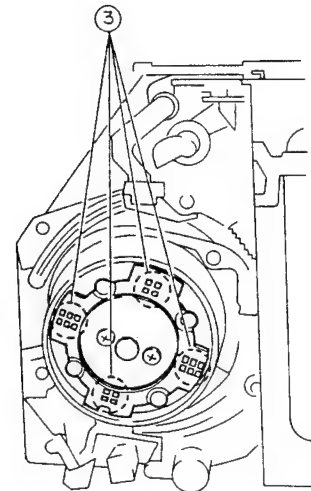


Fig. 2-55

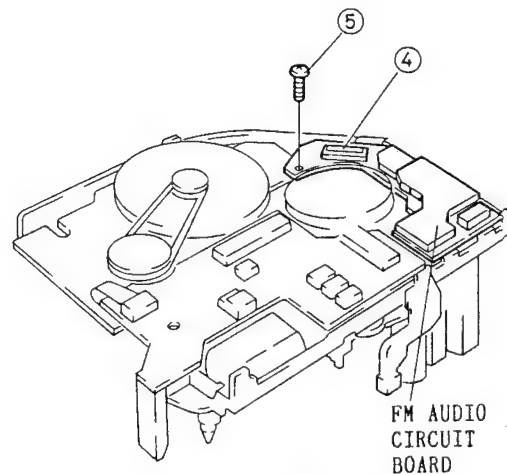


Fig. 2-55-1

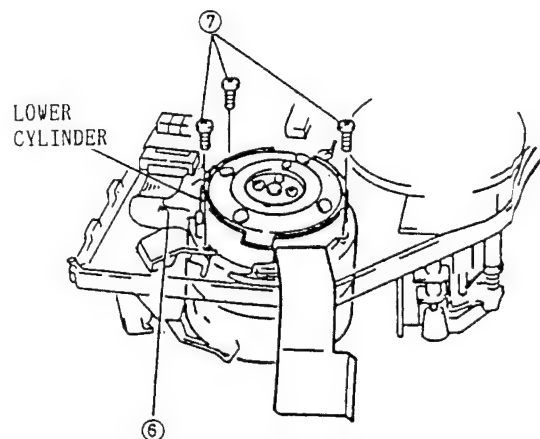


Fig. 2-55-2

3-3. Audio/Control (A/C) Head

1. Remove one (1) nut holding the plate spring. (See Fig. 2-56)
2. Remove three (3) screws holding the A/C head.

Note: Adjust as follows after installing the A/C head.

* CHAPTER 3

5-4. A/C HEAD ADJUSTMENT

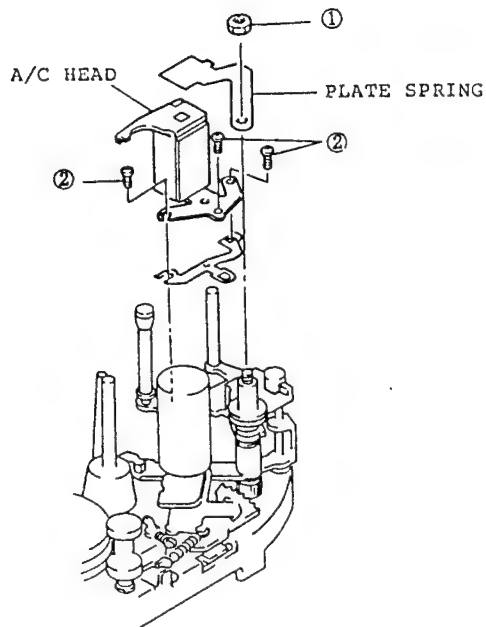


Fig. 2-56

3-4. End Sensor

1. Disconnect connector CN556.
(See Fig. 2-57)
2. Remove one (1) screw holding the end sensor. (See Fig. 2-58)

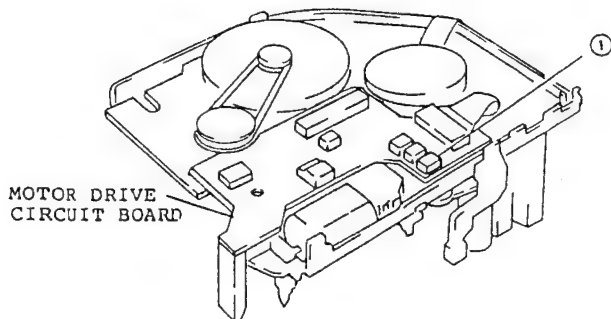


Fig. 2-57

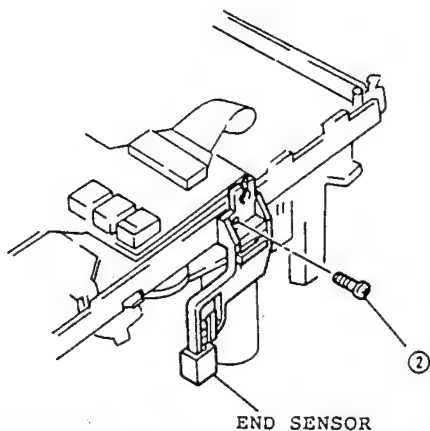


Fig. 2-58

3-5. Cassette Holder Switch

1. Disconnect connector CN554.
(See Fig. 2-59)
2. Release two (2) tabs on the cassette holder switch. (See Fig. 2-60)

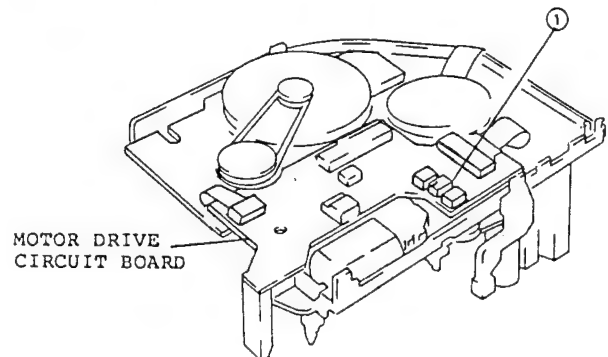


Fig. 2-59

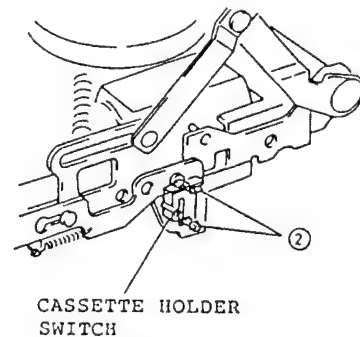


Fig. 2-60

3-6. Dew Sensor

1. Remove one (1) screw holding the dew sensor. (See Fig. 2-61)

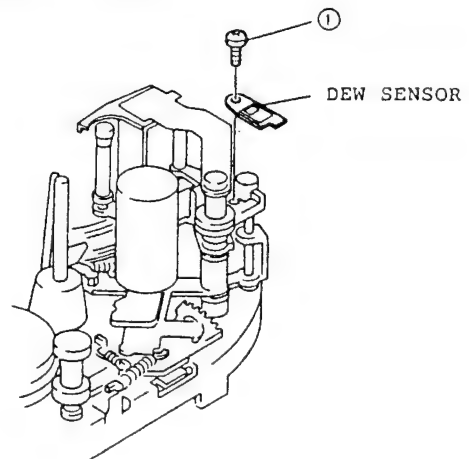


Fig. 2-61

3-7. Motor Drive Circuit Board (Safety Tab Switch, Supply Reel Sensor, End Lamp)

1. Disconnect five (5) connectors (CN554, CN555, CN556, CN557, CN558).
(See Fig. 2-62)
2. Disconnect two (2) flat cables (CN552, CN553).
3. Remove three (3) screws holding the motor drive circuit board.

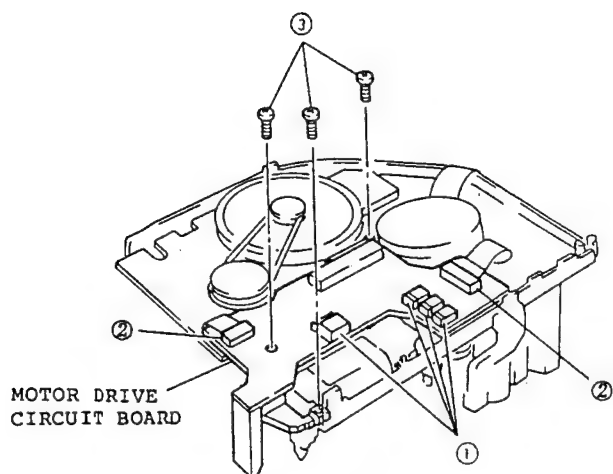


Fig. 2-62

3-8. Mechanism State Switch

1. Remove the motor drive circuit board. (See Fig. 2-62)
2. Remove two (2) screws holding the mechanism state switch. (See Fig. 2-63)

Note: Adjust as follows after installing the mechanism state switch.

* CHAPTER 3

2. MECHANISM STATE SWITCH PHASE MATCHING IN ASSEMBLY.

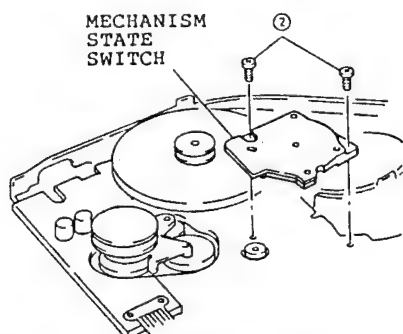


Fig. 2-63

3-9. Loading Motor

1. Remove the motor drive circuit board. (See Fig. 2-62)
2. Remove two (2) screws holding the loading motor. (See Fig. 2-64)

Note: Be careful that the loading gear (1) comes off when the loading motor is removed.

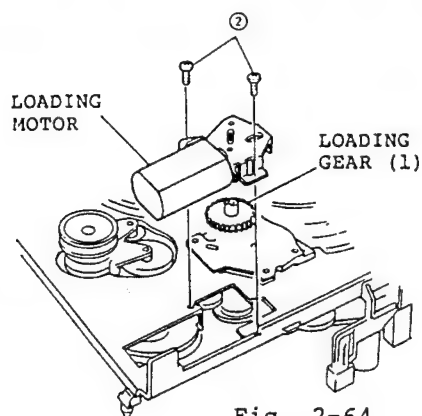


Fig. 2-64

3-10. Capstan Motor (Take-up Reel Sensor, Capstan FG Sensor)

1. Remove the motor drive circuit board. (See Fig. 2-62)
2. Remove the capstan belt. (See Fig. 2-65)
3. Remove three (3) screws holding the capstan motor while moving the middle guide arm in the direction of the arrow. (See Fig. 2-66)

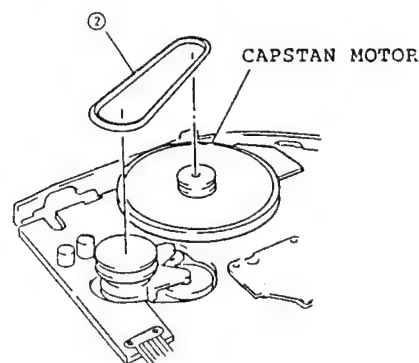


Fig. 2-65

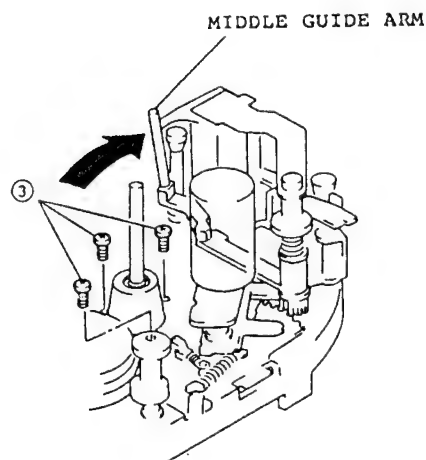


Fig. 2-66

3-11. Impedance Roller

1. Remove one (1) nut holding the impedance roller and pull out the roller from the chassis. (See Fig. 2-67)

Note: Be careful that the impedance roller sleeve, three washers and the flange come off when the impedance roller is removed. When reinstalling the impedance roller, be sure to put two specified washers (0.25 and 0.13 mm thick) between the chassis (loading gear block) and flange. Tighten the fixing nut until it stops.

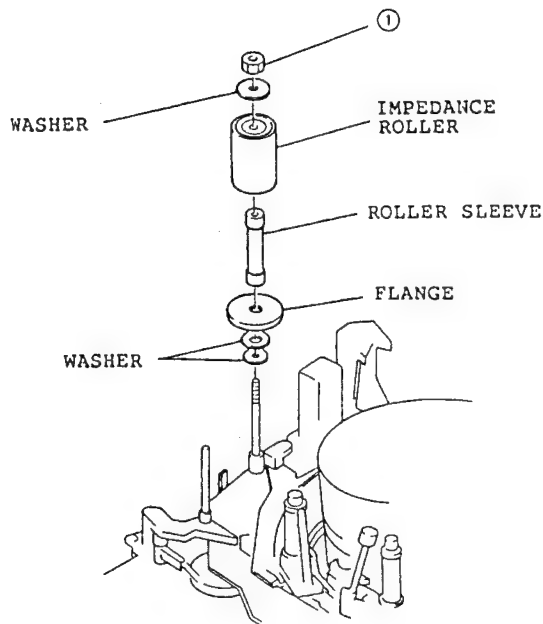


Fig. 2-67

3-12. Take-up Guide Pole

Note: As the take-up guide pole provides a reference for the tape transport system, do not remove it without sufficient reason.

Adjust as follows after installing the take-up guide pole.

* CHAPTER 3

5-2. TAKE-UP GUIDE POLE HEIGHT ADJUSTMENT

1. Loosen the nut at the top of the take-up guide pole and pull out the pole from the chassis. (See Fig. 2-68)

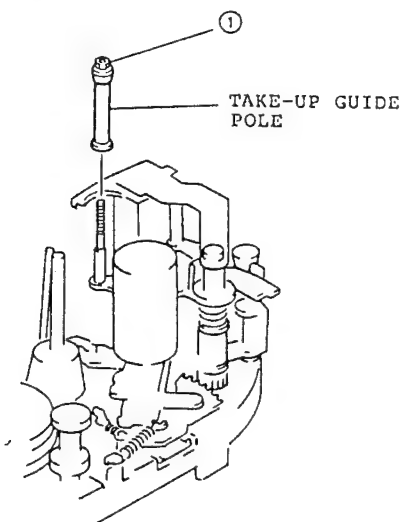


Fig. 2-68

3-13. Supply Guide Roller

1. Remove the cassette holder. (See Figs. 2-51, 2-52, 2-53)
 2. Remove one (1) hexagonal screw (0.7 mm) holding the supply guide roller. (See Fig. 2-69)
 3. Turn the top of the supply guide roller counterclockwise using a hexagonal wrench (2.0 mm) to remove the roller from the roller base.
- Note: Adjust as follows after installing the supply guide roller.

* CHAPTER 3

5-2. GUIDE ROLLER HEIGHT ADJUSTMENT

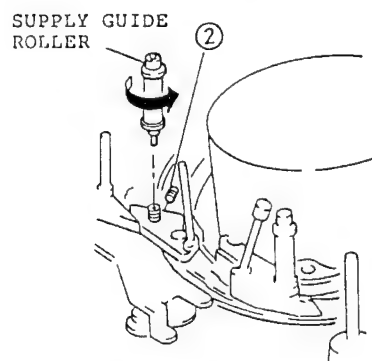


Fig. 2-69

3-14. Take-up Guide Roller

- 1.. Remove the cassette holder. (See Figs. 2-51, 2-52, 2-53)
 2. Remove the hexagonal screw (0.7 mm) holding the take-up guide roller. (See Fig. 2-70)
 3. Turn the top of the take-up guide roller counterclockwise using a hexagonal wrench (2.0 mm) to remove the roller from the roller base.
- Note: Adjust as follows after installing the take-up guide roller.

* CHAPTER 3

5-2. GUIDE ROLLER HEIGHT ADJUSTMENT

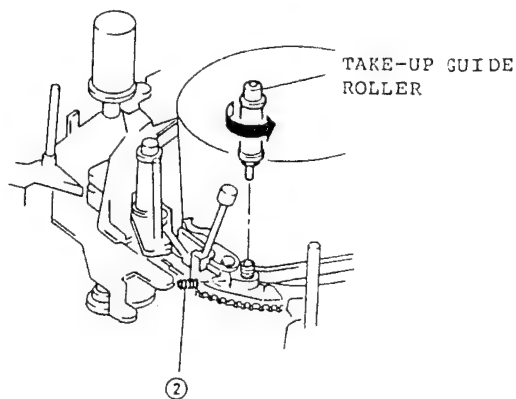


Fig. 2-70

3-15. Take-up Brake

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove the spring between the chassis and take-up brake and pull out the take-up brake from the chassis.
(See Fig. 2-71)

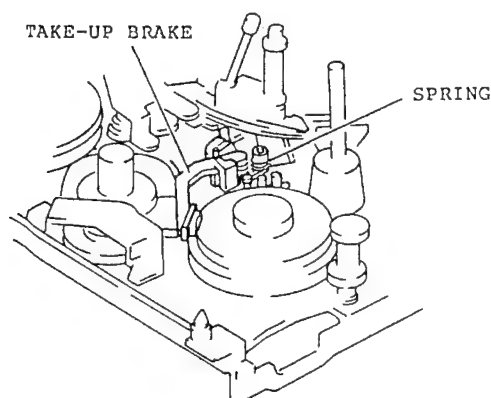


Fig. 2-71

3-17. Take-up Reel Gear

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove one (1) washer holding the take-up reel gear. (See Fig. 2-73)
3. Pull out the take-up reel gear from the chassis.

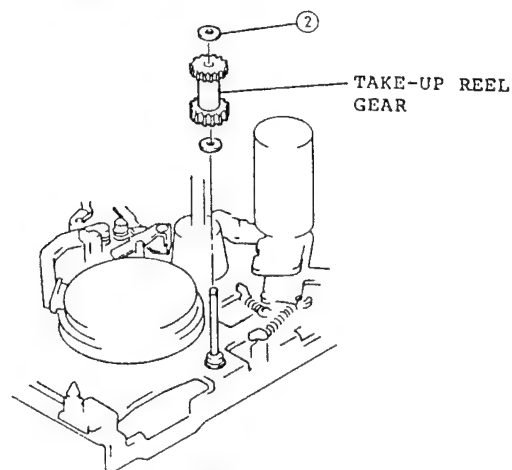


Fig. 2-73

3-16. Supply Reel Disk

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove one (1) washer holding the supply reel disk. (See Fig. 2-72)
3. Pull out the supply reel disk from the chassis.

Note: When reinstalling the supply reel disk, be sure to install the same number of the same washers between the supply reel disk and chassis as when the unit was shipped from the factory for the height adjustment.

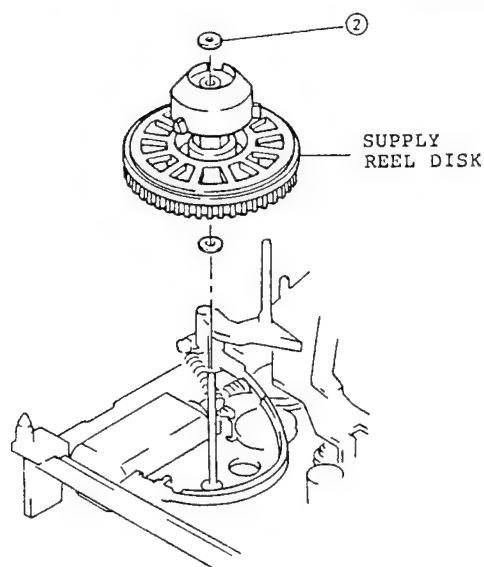


Fig. 2-72

3-18. Take-up Gear

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove the take-up brake.
(See Fig. 2-71)
3. Remove the take-up reel gear.
(See Fig. 2-73)
4. Remove one (1) washer holding the the take-up gear. (See Fig. 2-74)
5. Pull out the take-up gear from the chassis.

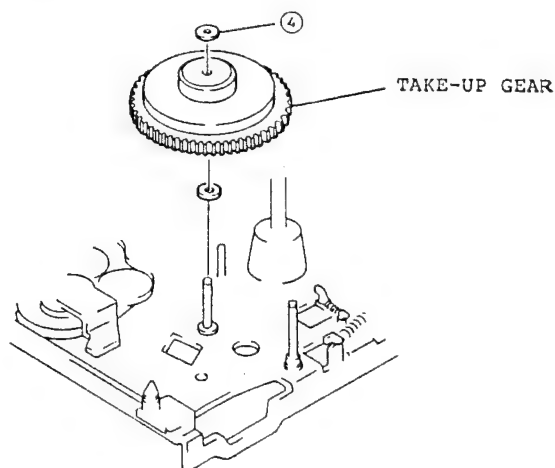


Fig. 2-74

3-19. Tension Arm and Tension Band

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove the supply reel disk.
(See Fig. 2-72)
3. Remove the spring between the tension arm and chassis. (See Fig. 2-75)
4. Remove one (1) washer holding the tension arm and one (1) screw holding the tension band.

Note: Adjust as follows after installing the tension arm and tension band.

* CHAPTER 3

5-1. TENSION POLE POSITION ADJUSTMENT/TENSION ADJUSTMENT

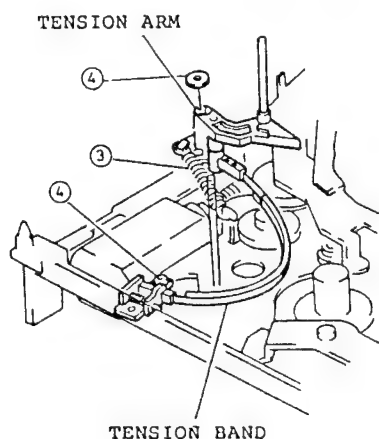


Fig. 2-75

3-20. Centre Gear Block

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove the take-up brake.
(See Fig. 2-71)
3. Remove the supply reel disk.
(See Fig. 2-72)
4. Remove the capstan belt.
(See Fig. 2-76)
5. Remove two (2) screws holding the centre gear block. (See Fig. 2-77)

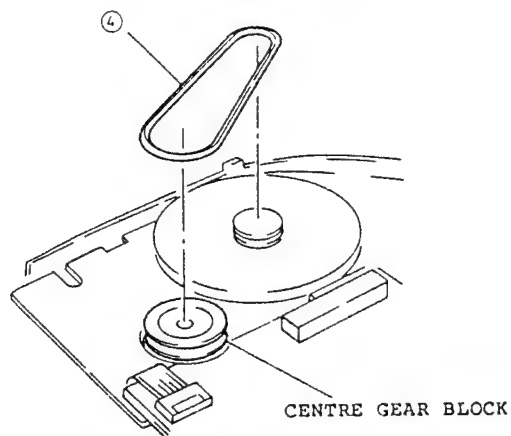


Fig. 2-76

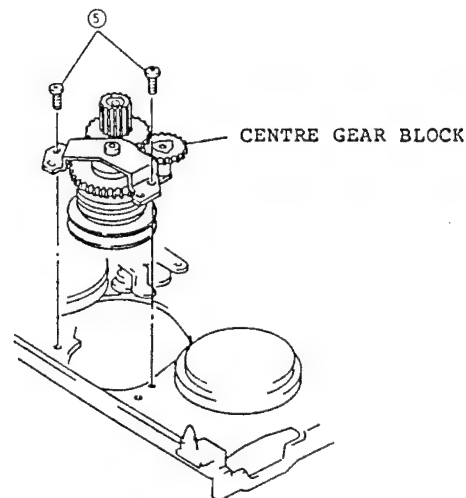


Fig. 2-77

3-21. A/C Head Arm

1. Remove the A/C head. (See Fig. 2-56)
2. Remove the dew sensor.
(See Fig. 2-61)
3. Release the spring between the A/C head arm and chassis.
(See Fig. 2-78)
4. Pull out the A/C head arm from the chassis.

Note: Be careful because the spring released in step 3 and a washer below it come off when the A/C head arm is removed.

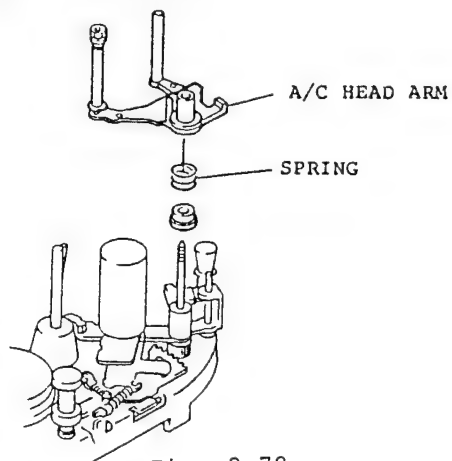


Fig. 2-78

3-22. Middle Guide Arm

1. Remove the A/C head. (See Fig. 2-56)
2. Remove the dew sensor.
(See Fig. 2-61)
3. Remove the A/C head arm.
(See Fig. 2-78)
4. Move the middle guide arm in the direction of the arrow and pull it out the middle guide arm from the chassis.
(See Fig. 2-79)

Note: Adjust as follows after installing the middle guide arm.

* CHAPTER 3

5-1. MIDDLE GUIDE ARM ASSEMBLING PHASE MARCHING

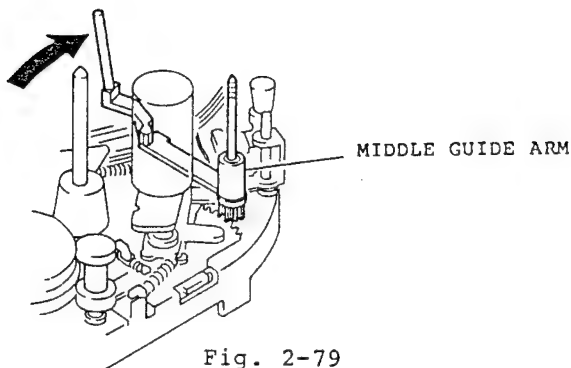


Fig. 2-79

3-23. Pressure Roller

1. Remove the A/C head. (See Fig. 2-56)
2. Remove the dew sensor.
(See Fig. 2-61)
3. Remove the A/C head arm.
(See Fig. 2-78)
4. Remove the middle guide arm.
(See Fig. 2-79)
5. Release the spring between the pressure roller and chassis.
(See Fig. 2-80)
6. Remove two (2) washers holding the pressure roller and pull out the pressure roller from the chassis.

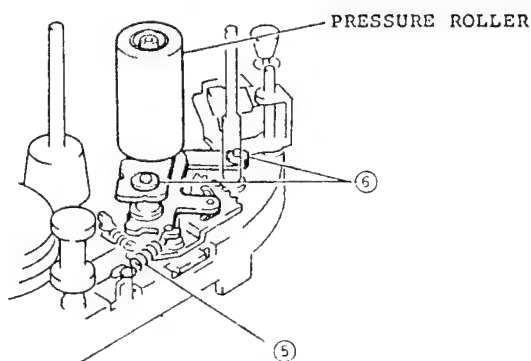


Fig. 2-80

3-24. Supply Guide Roller Base

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove the supply guide roller.
(See Fig. 2-69)
3. Remove the supply reel disk.
(See Fig. 2-72)
4. Remove the tension arm and tension band. (See Fig. 2-75)
5. Remove one (1) washer holding the supply guide roller base.
(See Fig. 2-81)

Note: Be careful because the spacer between the washer and supply guide roller and chassis comes off when the supply guide roller base is removed.

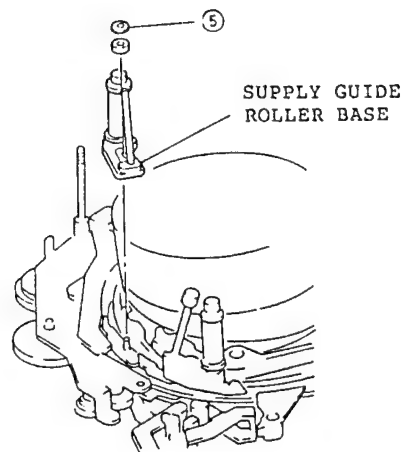


Fig. 2-81

3-25. Take-up Guide Roller Base

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
 2. Remove the take-up guide roller.
(See Fig. 2-70)
 3. Remove one (1) screw holding the take-up guide roller base holder.
(See Fig. 2-82)
 4. Remove one (1) washer holding the take-up guide roller base.
- Note: Be careful because the guide roller base shaft comes off when the take-up guide roller base is removed.

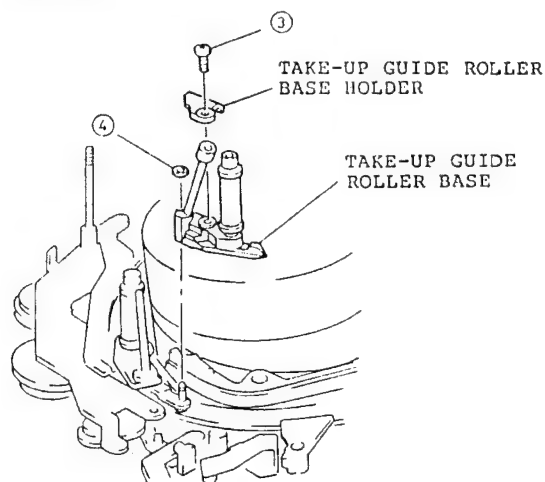


Fig. 2-82

3-26. Supply Guide Roller Rail

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove the impedance roller.
(See Fig. 2-67)
3. Remove the supply guide roller.
(See Fig. 2-69)
4. Remove the supply reel disk.
(See Fig. 2-72)
5. Remove the tension arm and tension band. (See Fig. 2-75)
6. Remove the supply guide roller base.
(See Fig. 2-81)
7. Remove two (2) screws holding the supply guide roller rail.
(See Fig. 2-83)

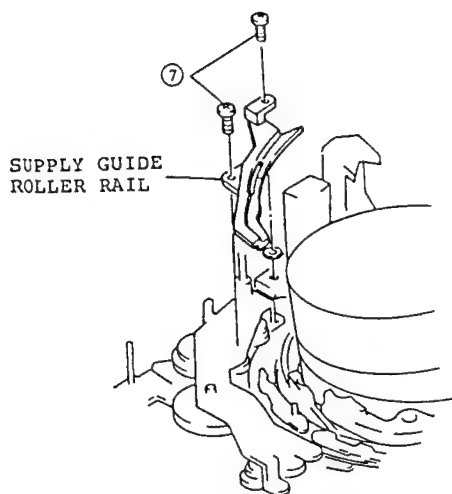


Fig. 2-83

3-27. Loading Gear Block

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove the impedance roller.
(See Fig. 2-67)
3. Remove the supply guide roller.
(See Fig. 2-69)
4. Remove the supply reel disk.
(See Fig. 2-72)
5. Remove the tension arm and tension band.
(See Fig. 2-75)
6. Remove the supply guide roller base.
(See Fig. 2-81)
7. Remove the supply guide roller rail.
(See Fig. 2-83)
8. Remove two (2) screws holding the loading gear block. (See Fig. 2-84)

Note: Adjust as follows after installing the loading gear block.

* CHAPTER 3

1. PHASE MATCHING OF TAKE-UP/
SUPPLY LOADING RINGS AND
LOADING GEAR BLOCK IN
ASSEMBLY.

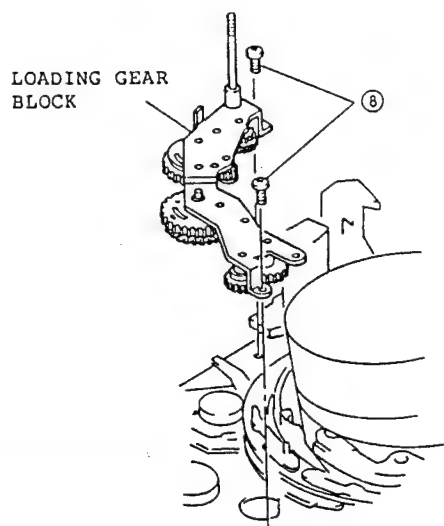


Fig. 2-84

3-28. Take-up Loading Ring Holders (1)/(2)

1. Remove the A/C head. (See Fig. 2-56)
2. Remove the dew sensor.
(See Fig. 2-61)
3. Remove the A/C head arm.
(See Fig. 2-78)
4. Remove the middle guide arm.
(See Fig. 2-79)
5. Remove one (1) screw holding the take-up loading ring holder (2).
(See Fig. 2-85)
6. Remove one (1) screw holding the take-up loading ring holder (1).

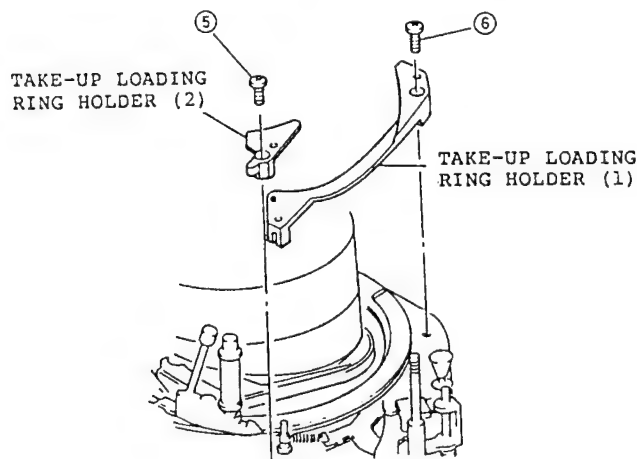


Fig. 2-85

3-29. Supply Loading Ring Holder

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove the cylinder.
(See Figs. 2-54, 2-55)
3. Remove the impedance roller.
(See Fig. 2-67)
4. Remove the supply guide roller.
(See Fig. 2-69)
5. Remove the supply reel disk.
(See Fig. 2-72)
6. Remove the tension arm and tension band. (See Fig. 2-75)
7. Remove the supply guide roller base.
(See Fig. 2-81)
8. Remove two (2) screws holding the supply loading ring holder.
(See Fig. 2-86)

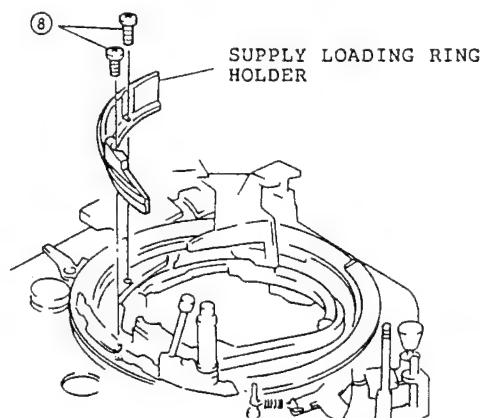


Fig. 2-86

3-30. Take-up Guide Roller Rail

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove the cylinder.
(See Figs. 2-54, 2-55)
3. Remove the take-up guide roller.
(See Fig. 2-70)
4. Remove the take-up guide roller base.
(See Fig. 2-82)
5. Remove three (3) screws holding the take-up guide roller rail.
(See Fig. 2-87)

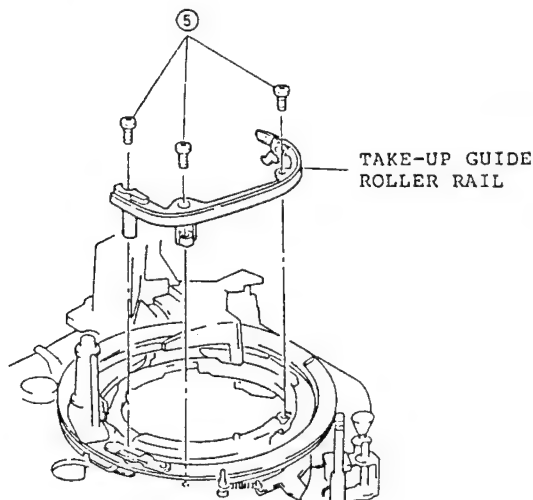


Fig. 2-87

3-31. Loading Gear (2)

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove the impedance roller.
(See Fig. 2-67)
3. Remove the supply guide roller.
(See Fig. 2-69)
4. Remove the supply reel disk.
(See Fig. 2-72)
5. Remove the tension arm and tension band.
(See Fig. 2-75)
6. Remove the supply guide roller base.
(See Fig. 2-81)
7. Remove the supply guide roller rail.
(See Fig. 2-83)
8. Remove the loading gear block.
(See Fig. 2-84)
9. Remove one (1) washer holding the loading gear (2). (See Fig. 2-88)

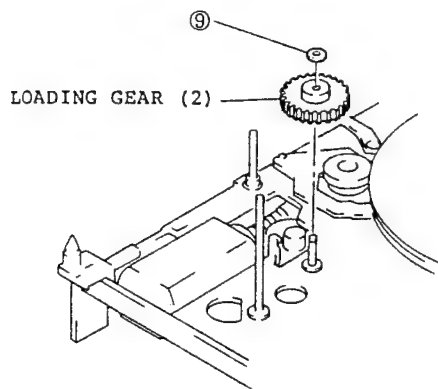


Fig. 2-88

3-32. Supply Loading Ring

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
 2. Remove the A/C head.
(See Fig. 2-56)
 3. Remove the dew sensor.
(See Fig. 2-61)
 4. Remove the impedance roller.
(See Fig. 2-67)
 5. Remove the supply guide roller.
(See Fig. 2-69)
 6. Remove the supply reel disk.
(See Fig. 2-72)
 7. Remove the tension arm and tension band.
(See Fig. 2-75)
 8. Remove the A/C head arm.
(See Fig. 2-78)
 9. Remove the middle guide arm.
(See Fig. 2-79)
 10. Remove the supply guide roller base.
(See Fig. 2-81)
 11. Remove the supply guide roller rail.
(See Fig. 2-83)
 12. Remove the loading gear block.
(See Fig. 2-84)
 13. Remove the take-up loading ring holders (1) and (2). (See Fig. 2-85)
 14. Remove the supply loading ring from the chassis. (See Fig. 2-89)
- Note: Adjust as follows after installing the supply loading ring.

* CHAPTER 3

1. PHASE MATCHING OF TAKE-UP/
SUPPLY LOADING RINGS AND
LOADING GEAR BLOCK IN
ASSEMBLY.

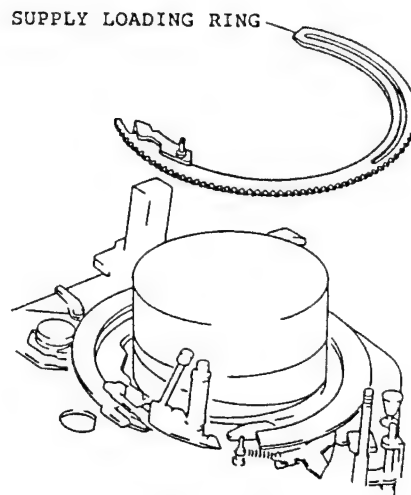


Fig. 2-89

3-33. Take-up Loading Ring

1. Remove the cassette holder.
(See Figs. 2-51, 2-52, 2-53)
2. Remove the cylinder.
(See Figs. 2-54, 2-55)
3. Remove the A/C head.
(See Fig. 2-56)
4. Remove the dew sensor.
(See Fig. 2-61)
5. Remove the impedance roller.
(See Fig. 2-67)
6. Remove the supply guide roller.
(See Fig. 2-69)
7. Remove the supply reel disk.
(See Fig. 2-72)

8. Remove the tension arm and tension band. (See Fig. 2-75)
9. Remove the A/C head arm. (See Fig. 2-78)
10. Remove the middle guide arm. (See Fig. 2-79)
11. Remove the supply guide roller base. (See Fig. 2-81)
12. Remove the take-up guide roller base. (See Fig. 2-82)
13. Remove the supply guide roller rail. (See Fig. 2-83)
14. Remove the loading gear block. (See Fig. 2-84)
15. Remove the take-up loading ring holders (1) and (2). (See Fig. 2-85)
16. Remove the supply loading ring holder. (See Fig. 2-86)
17. Remove the take-up guide roller rail. (See Fig. 2-87)
18. Remove the supply loading ring. (See Fig. 2-89)
19. Remove one (1) screw holding the take-up loading ring holder (3). (See Fig. 2-90)
20. Remove the take-up loading ring from the chassis.

Note: Adjust as follows after installing the take-up loading ring.

* CHAPTER 3

1. PHASE MATCHING OF TAKE-UP/
SUPPLY LOADING RINGS AND
LOADING GEAR BLOCK IN
ASSEMBLY.

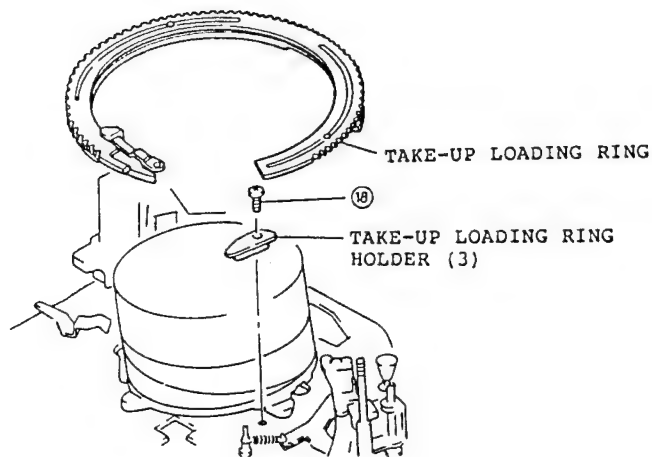


Fig. 2-90

3-34. Catcher Block and Full Erase (FE) Head

Remove the supply and take-up loading rings as described previously.

1. Remove two (2) screws holding the catcher block. (See Fig. 2-91)
2. Remove one (1) screw at the back of the catcher block which holds the FE head.

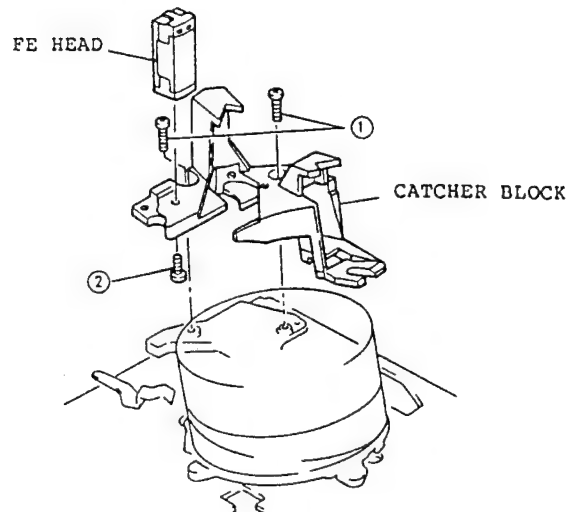


Fig. 2-91

3-35. Cylinder Base

Remove the supply and take-up loading rings as described previously.

1. Remove the catcher block. (See Fig. 2-91)
2. Remove three (3) screws holding the cylinder base. (See Fig. 2-92)

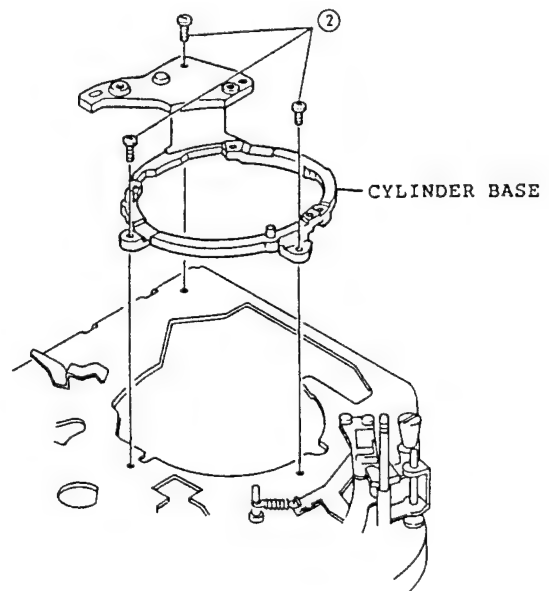


Fig. 2-92

3-36. Synchro Gear

Remove the supply and take-up loading rings as described previously.

1. Remove one (1) washer holding the synchro gear. (See Fig. 2-93)

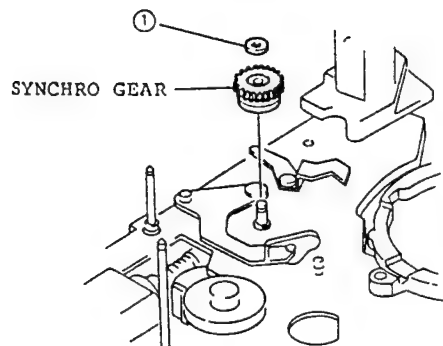


Fig. 2-93

3-37. Pressure Roller Arm and Pressure Roller Control Arm

Remove the supply and take-up loading rings as described previously.

1. Turn the X-value adjustment nut counterclockwise to remove it from the chassis. (See Fig. 2-94)
2. Remove one (1) washer holding the pressure roller arm.
3. Remove one (1) washer holding the pressure roller control arm.
4. Pull out the pressure roller arm and pressure roller control arm from the chassis.

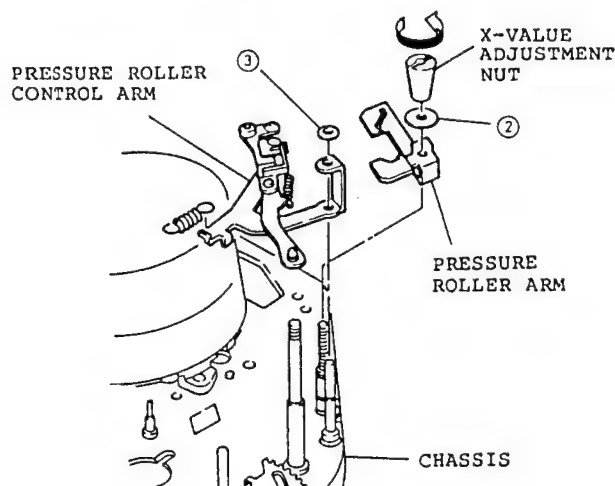


Fig. 2-94

4. LENS BLOCK REMOVAL

Remove the right case and left case as described previously.

4-1. Lens Block

1. Remove the autofocus circuit board. (See Figs. 2-17, 2-18)
2. Remove the control circuit board. (See Figs. 2-22, 2-23)
3. Remove the process circuit board. (See Figs. 2-24, 2-25, 2-26)
4. Remove the sensor circuit board. (See Figs. 2-27, 2-28)
5. Remove titler circuit board. (See Fig. 2-28)
6. Remove the DC-DC converter. (See Fig. 2-30)

7. Remove two (2) screws holding the titler circuit board holder. (See Fig. 2-101)
8. Remove two (2) screws holding the sensor shield case. (See Fig. 2-102)

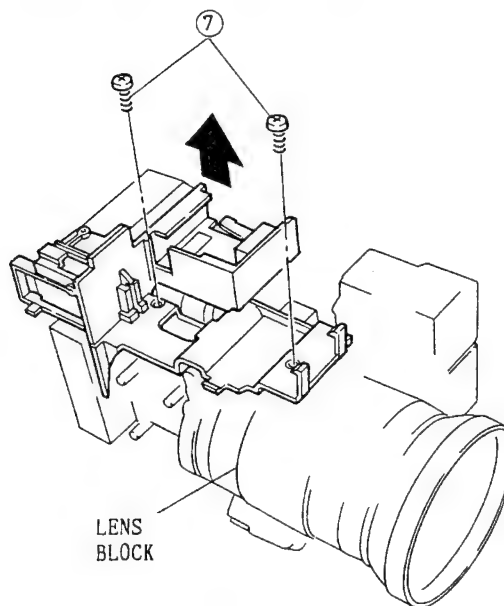


Fig. 2-101

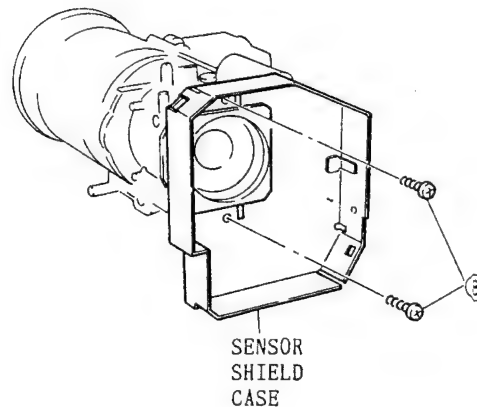


Fig. 2-102

4-2. Zoom Motor

Remove the lens block as described previously.

1. Remove one (1) screw holding the zoom motor. (See Fig. 2-103)

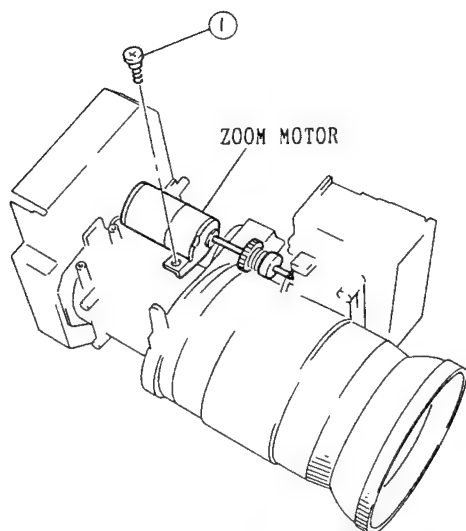


Fig. 2-103

4-3. Focus Motor

Remove the lens block as described previously.

1. Remove one (1) screw holding the focus motor. (See Fig. 2-104)

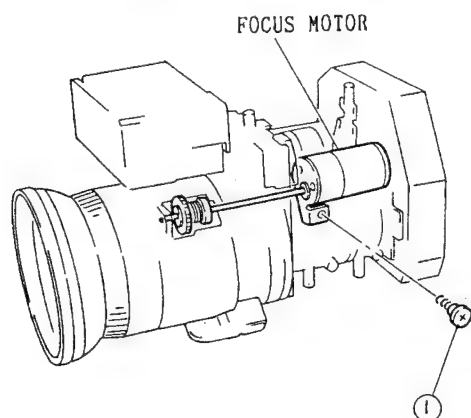


Fig. 2-104

4-4. Iris Motor

Remove the lens block as described previously.

1. Remove one (1) screw holding the iris motor. (See Fig. 2-105)

Note: Be careful that two iris shutters come off when the iris motor is removed.

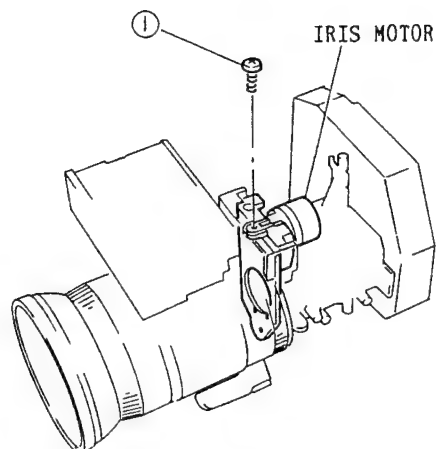


Fig. 2-105

5. ELECTRONIC VIEWFINDER (EVF) REMOVAL

Remove the electronic viewfinder as described previously.

5-1. Bottom Case

1. Turn the EVF lens block in the direction of the arrow to pull it out from the EVF. (See Fig. 2-111)
2. Remove four (4) screws holding the bottom case.

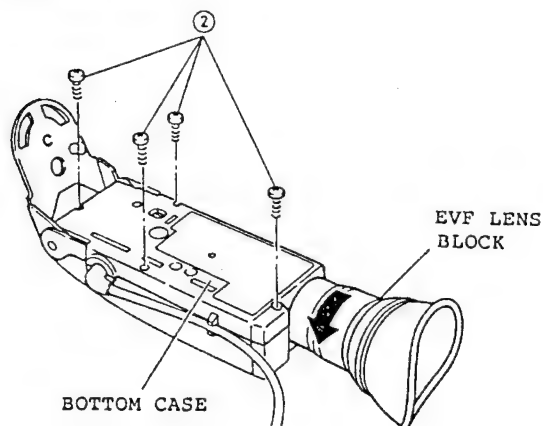


Fig. 2-111

5-2. Top Case

1. Remove the bottom case. (See Fig. 2-111)
2. Remove the electronic viewfinder (EVF) circuit board and CRT from the top case. (See Fig. 2-112)

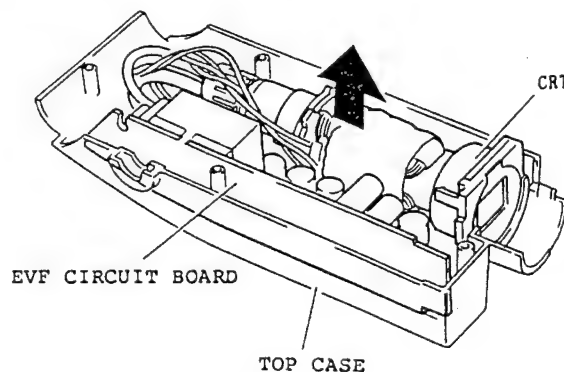


Fig. 2-112

5-3. Electronic Viewfinder (EVF) Circuit Board

1. Remove the bottom case.
(See Fig. 2-111)
2. Remove the top case. (See Fig. 2-112)
3. Disconnect connector CN802 and the CRT socket. (See Fig. 2-113)

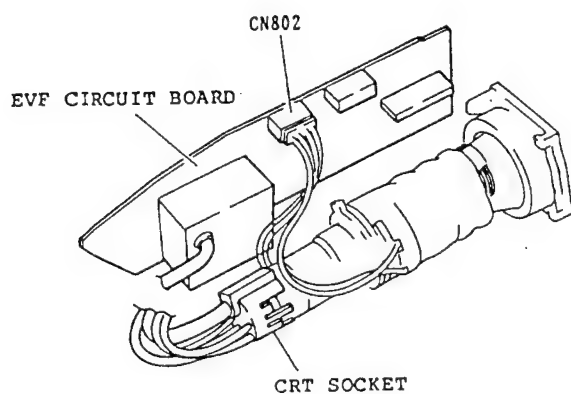


Fig. 2-113

5-4. CRT

1. Remove the bottom case.
(See Fig. 2-111)
2. Remove the top case. (See Fig. 2-112)
3. Remove the EVF circuit board.
(See Fig. 2-113)
4. Remove one (1) screw holding the deflection yoke in the direction of arrow (A). (See Fig. 2-114)
5. Remove the CRT cover in the direction of arrow (B).

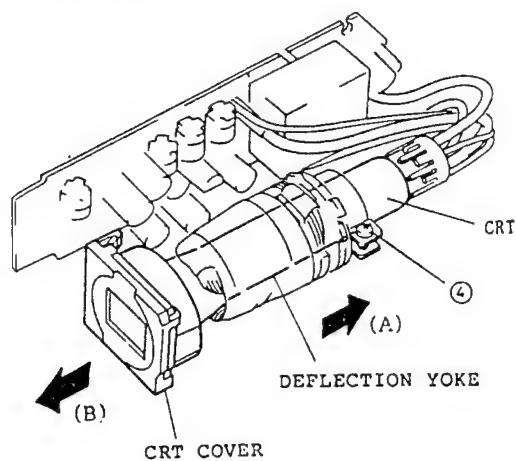
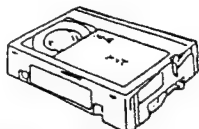
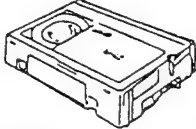
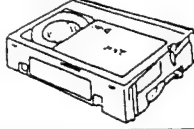

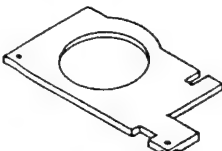
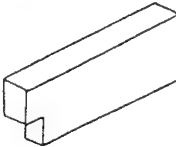





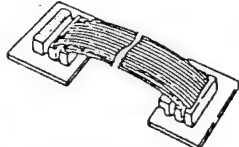

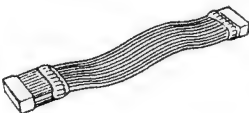
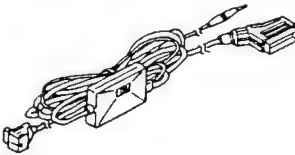



Fig. 2-114

JIG AND TAPES FOR ADJUSTMENT

1. ALIGNMENT TAPE (50HMBE-3C) COLOUR BAR/NONE No. 7099280 	2. ALIGNMENT TAPE (HMAE-3C) NONE/1kHz No. 7099281 	3. ALIGNMENT TAPE (50HMPE-3C) MONOSCOPE/7kHz No. 7099274 	4. BACKTENSION/PLAY TORQUE METER No. 7099272 
5. MASTER PLANE No. 7099313 	6. HEIGHT JIG No. 7099259 	7. SEMI-VARIABLE RESISTOR ADJ. DRIVER No. 7099315 	8. REEL GEAR INSTALLATION JIG No. 7099314 
9. 0.7/1.27/2.0mm HEXAGONAL WRENCHES 0.7mm : No. 7099316 1.27mm : No. 7099329 	10. BACKFOCUS ADJUSTMENT DRIVER No. 7099205 	11. EXTENSION POWER CABLE No. 7099326 	12. EXTENSION CABLE 30-PIN : No. 7099311 
13. EXTENSION CABLE 16-PIN : No. 7099359 14-PIN : No. 7099360 8-PIN : No. 7099363 	14. EXTENSION CABLE 14-PIN : No. 7099362 8-PIN : No. 7099361 	15. A/V OUTPUT CABLE No. 5858521 	16. LIGHT BALANCING FILTER C8 : No. 7099223 C2 : No. 7099225 

CHAPTER 3

MECHANICAL ADJUSTMENT

1. PHASE MATCHING OF TAKE-UP/SUPPLY LOADING RINGS AND LOADING GEAR BLOCK IN ASSEMBLY (Figs. 3-1, 3-2, 3-3)

Always perform this adjustment when reinstalling the take-up/supply loading rings and loading gear block.

- 1) Install the take-up loading ring so that the space between the right edge of the take-up loading ring and pressure roller control arm is 0.5mm. (See Fig. 3-1)
- 2) Align the right end of the groove in the take-up loading ring with hole (B) in the multi-cam slider.
- 3) Insert a pin into hole (A) and stick it into the chassis at right angles.
- 4) Set gear (2), gear (3) and gear (8) of the loading gear block as shown in Fig. 3-2 (A).
- 5) Attach the loading gear installation jig to the loading gear block in the state set in step 4) as shown in Fig. 3-2 (B).
- 6) Assemble the loading gear block with the jig attached in the chassis so that hole (C) in the take-up loading ring and the recess of gear (8) are aligned and marking (A) on the take-up loading ring and marking (B) on gear (2) are aligned. (See Fig. 3-1)

- 7) Remove the pin and loading gear installation jig.
- 8) Assemble the supply loading ring into the chassis so that marking (C) on the supply loading ring and marking (D) on gear (3) are aligned. (See Fig. 3-3)

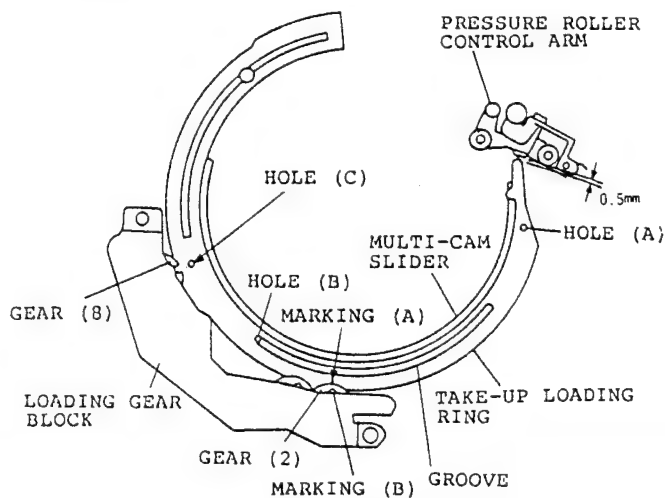


Fig. 3-1

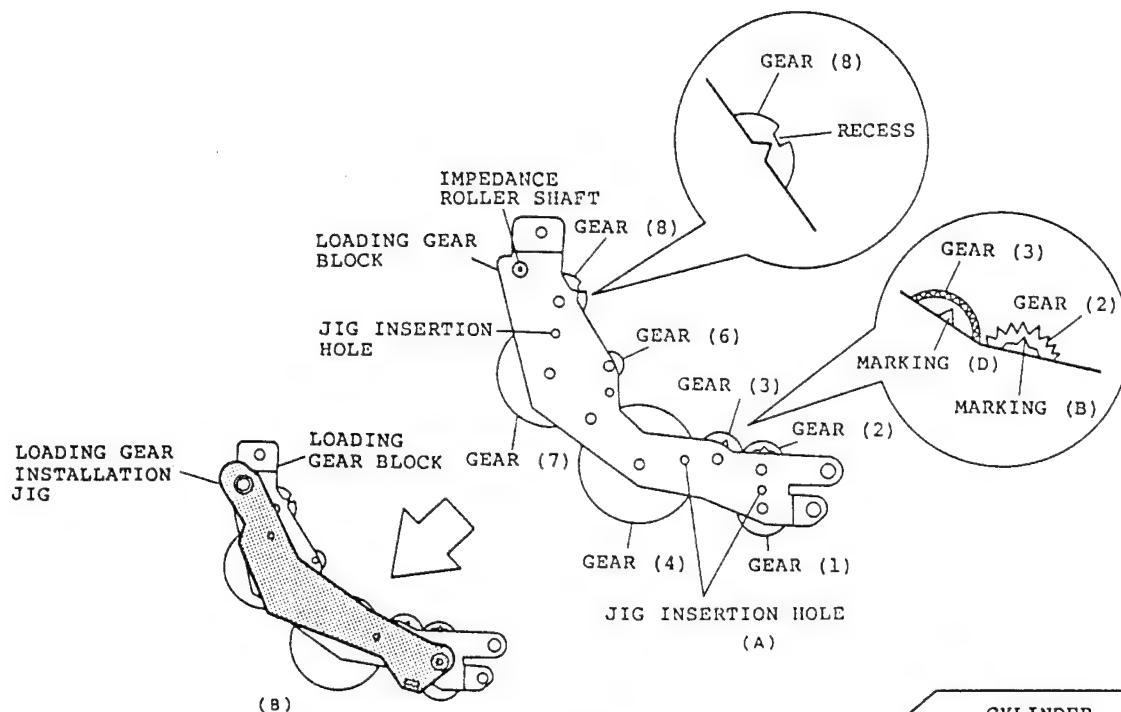


Fig. 3-2

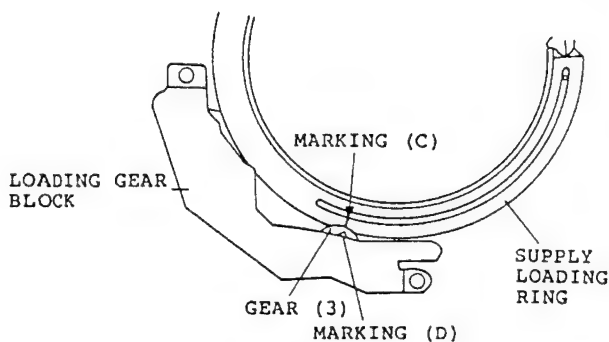


Fig. 3-3

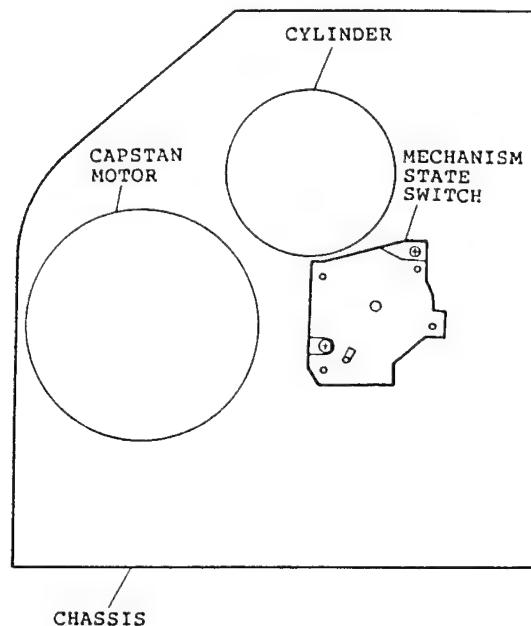


Fig. 3-5

2. MECHANISM STATE SWITCH PHASE MATCHING IN ASSEMBLY (Figs. 3-4, 3-5)

Always perform this adjustment when reinstalling the mechanism state switch after checking that the take-up/supply loading rings and loading gear block are set to the positions installed in item 1.

- 1) Align hole (A) in the mechanism state switch holder and marking (A) on the rotor. (See Fig. 3-4)
- 2) Assemble the mechanism state switch into the chassis in the conditions set in step 1). (See Fig. 3-5)

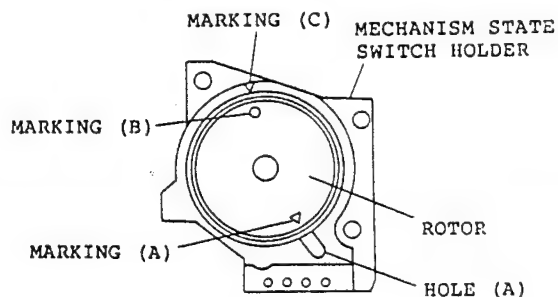


Fig. 3-4

3. CONFIRMATION OF UNLOADING POSITION (Fig. 3-6)

Always perform this confirmation after reinstalling the take-up/supply loading rings, loading gear block and mechanism state switch.

- 1) After performing loading and unloading several times, set the unit to the unloading (stop) state and check that marking (A) on the take-up guide roller rail and the center of take-up guide roller base holder are approximately aligned, and marking (B) on the supply loading ring holder and marking (C) on the supply guide roller base are also aligned. (See Fig. 3-6)

- 2) If the above conditions are not satisfied, match the phase of the take-up/supply loading rings and loading gear block and the phase of the mechanism state switch again.

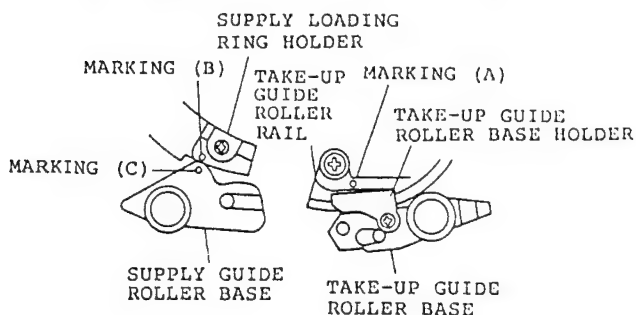


Fig. 3-6

4. MIDDLE GUIDE ARM ASSEMBLING PHASE MATCHING (Fig. 3-7)

Always perform this adjustment when reinstalling the middle guide arm.

- 1) Assemble the middle guide arm into the chassis so that marking (A) on the arm and marking (B) on the pressure roller gear are aligned.

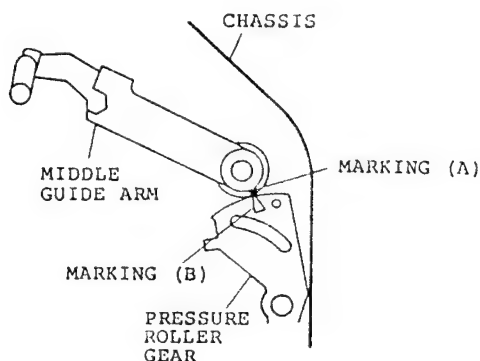


Fig. 3-7

5. TAPE TRANSPORT SYSTEM COMPONENTS CHECK/ADJUSTMENT

The tape transport system is the path from the supply reel disk to the take-up reel gear via the video heads. The tape transport components, especially the components that come into direct contact with tape, must be kept clean without damage, dust, oil, etc. adhering to contact surfaces. The tape transport system is adjusted before shipment from the factory, so that only when any transport components are replaced, their checking and adjustment are necessary. Confirm the following three items before performing checks and adjustments.

- 1) Check that the same number of the same washers as when the unit is shipped from the factory are between the supply reel disk and chassis.
- 2) Check that two specified washers (0.25 mm and 0.13 mm thick) are

between the impedance roller and chassis. Also check that the nut on the impedance roller is tightened firmly.

- 3) Check that the cylinder brush is in contact with the approximate centre of the cylinder shaft.

5-1. TENSION POLE POSITION ADJUSTMENT/ TENSION ADJUSTMENT (Fig. 3-8)

Tension Pole Position Adjustment

- 1) Load a blank tape and set the unit to the play mode. (Rewind the tape completely before loading it.)
- 2) Adjust screw (A) so that the inner flange of the tension arm is aligned with the left edge of hole A in the loading gear block at the start of tape as shown in Fig. 3-8.

Tension Adjustment

- 1) Load the back-tension/play torque meter and set the unit to the play mode.
- Note: When the back-tension/play torque meter is viewed from above, the left meter indicates back-tension torque.
- 2) Check that the back-tension torque is between 18 and 26 g-cm.
- 3) If the measurement value is outside the above specification, check the tension pole position and then clean the supply reel disk and replace the tension band.

Note: After adjustment is completed, fix screw (A) with lock paint.

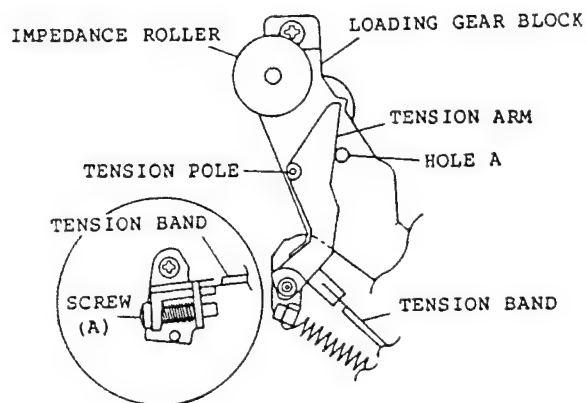


Fig. 3-8

5-2. TAKE-UP GUIDE POLE HEIGHT ADJUSTMENT (Fig. 3-9)

Note: As the take-up guide pole provides a reference for the tape transport system, do not adjust it without sufficient reason.

- 1) Place the master plane on the cassette holder and lower the cassette holder.
- 2) Mount the height jig on the master plane and fit it to the guide pole.

- 3) Adjust the guide pole height adjustment nut so that the bottom edge of the upper flange of the take-up guide pole and the top edge of the height jig are aligned.
- 4) Run the tape and check that no curling or creasing occurs. If it occurs, readjust the height adjustment nut.

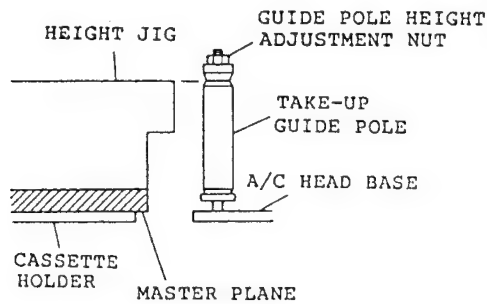


Fig. 3-9

5-3. GUIDE ROLLER HEIGHT ADJUSTMENT (Figs. 3-10, 3-11)

Rough Adjustment

- 1) Place the master plane on the cassette holder and lower the cassette holder.
- 2) Mount the height jig on the master plane and fit it to the supply guide roller.
- 3) Loosen the hexagonal screw (0.7 mm) holding the supply guide roller. (See Fig. 3-10)
- 4) Adjust the hexagonal screw (2.0 mm) using a hexagonal wrench so that the bottom edge of the upper flange of the supply guide roller and the top edge of the height jig are aligned.
- 5) Roughly adjust the take-up guide roller roughly in the same way.

Note: After this rough adjustment is completed, always perform the following precise adjustment.

Precise Adjustment

- 6) Complete the guide roller height rough adjustment.
- 7) Connect an oscilloscope to TP203 on the luma/chroma circuit board.
- 8) Synchronize the oscilloscope with TP202 (SW25) on the luma/chroma circuit board.
- 9) Set the TRACKING control to the centre click position.
- 10) Playback the alignment tape (50HMPE-3C).
- 11) Check that the FM waveform is flat.
- 12) Then check that the FM drops at the start and end of the envelope are equal when the TRACKING control is turned to the left and right.
- 13) If the above item cannot be confirmed, loosen the hexagonal screws (0.7mm) holding the supply and take-up guide rollers, and fine adjust the height of both guide rollers so the FM waveform is flat and the FM drops at the start and end

of the envelope are equal when the TRACKING control is turned to the left and right.

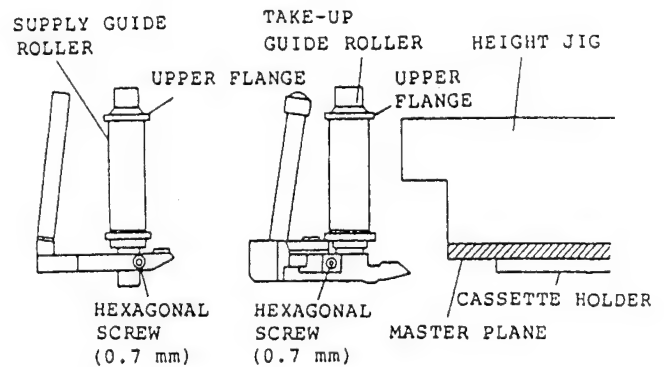
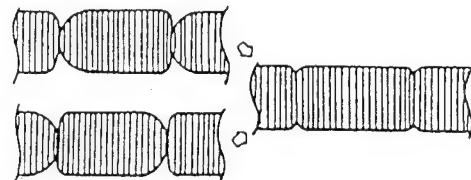
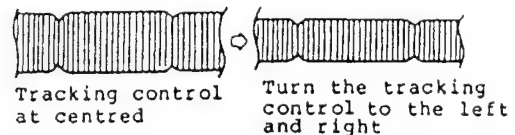


Fig. 3-10



Turn guide roller height adjustment screw a little at a time to flatten waveform



Tracking control at centred

Turn the tracking control to the left and right

FM OUTPUT

Fig. 3-11

5-4. A/C HEAD ADJUSTMENT

(Figs. 3-12, 3-13, 3-14, 3-15)

Perform the height, tilt, azimuth and X-value adjustments in this item. When the A/C head is reinstalled, perform the height, tilt and azimuth adjustments repeatedly to determine the A/C head installation position, then perform the X-value adjustment. Always perform rough adjustment first and then precise adjustment. If the A/C head adjustment is not performed, the middle guide arm strikes against the A/C head and the loading state is not obtained.

Rough Adjustment

- 1) Place the master plane on the cassette holder and lower the cassette holder.
- 2) Adjust the height adjustment nut so that the top of the master plane is 2.0 ± 0.2 mm higher than the A/C head base. (See Fig. 3-12)
- 3) Adjust screws (A), (B) and (C) so that there is 2.0 ± 0.2 mm between the bottom edges of the A/C head plate and A/C head base, and the A/C head is at right angles to the A/C head base.

Precise Adjustment

- 4) Connect an oscilloscope to the audio output jack.
- 5) Playback the alignment tape (50HMPE-3C).
- 6) Adjust screws (A), (B) and (C) so that the audio output is maximum and flat (without fluctuations). (See Figs. 3-12, 3-13)

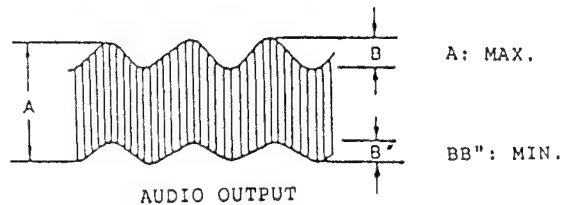


Fig. 3-13

X-Value Adjustment

- 7) Connect an oscilloscope to TP203 on the luma/chroma circuit board.
- 8) Synchronize the oscilloscope with TP202 (SW25) on the luma/chroma circuit board.
- 9) Playback the alignment tape (50HMPE-3C).
- 10) Turn the TRACKING control to the left and right from the centre click position and check that the FM output is maximum at the centre position and starts to drop at the same gradient on the left and right. If the above conditions are satisfied, the X-value adjustment is correct. (See Figs. 3-14, 3-15)
- 11) If the above conditions are not satisfied, adjust the X-value adjustment nut using a flat-bladed screwdriver, etc. so that the FM output is maximum when the TRACKING control is set to the centre click position and it starts to drop when the control is turned to the left and right at the same angle.
- 12) Check step 9) again.

Note: After adjustment is completed, adjust the audio bias level in 3. VTR SECTION ADJUSTMENT in ELECTRICAL ADJUSTMENT.

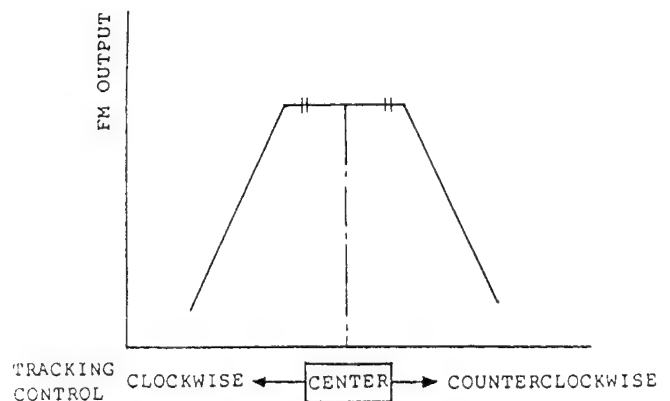


Fig. 3-14

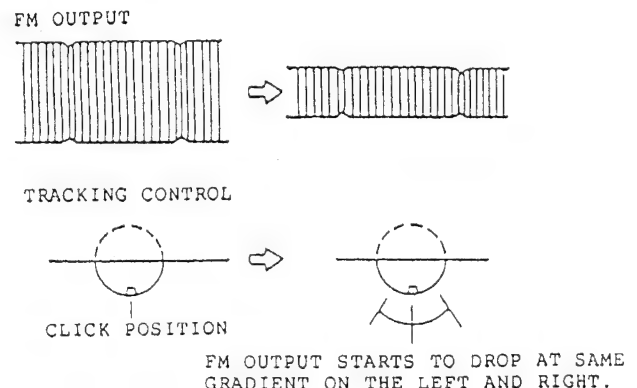


Fig. 3-15

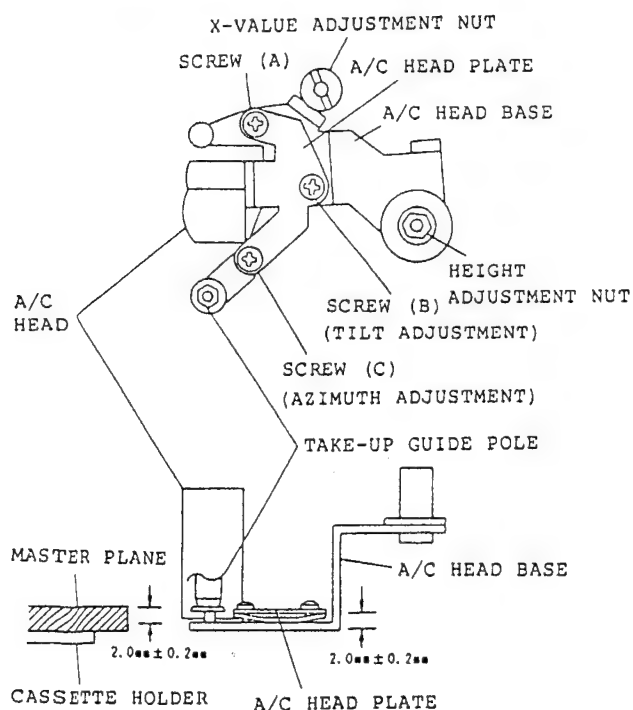


Fig. 3-12

6. ADJUSTMENT AFTER REPLACING CYLINDER (VIDEO HEADS) (Fig. 3-16)

When the cylinder is replaced, the relative height of the cylinder and guide roller, and the X-value, etc. drift (the drift is very small when the cylinder is replaced correctly), so that the tape transport system and servo system must be adjusted. Perform check and adjustment following the order below.

- 1) Load a blank tape and playback it. Check that no curling or creasing occurs around the guide rollers. If it does, fine adjust the height of the guide rollers.
- 2) Check that the FM output is flat without level fluctuations. If it cannot be checked, adjust the height of the guide rollers. Refer to the following item for how to check the flatness.

- 3) Perform check and adjustment of the head switching point. Refer to 3. VTR SECTION ADJUSTMENT in ELECTRICAL ADJUSTMENT for the adjustment method.
- 4) Check that the X-value adjustment is correct. (If it cannot be checked, do not adjust the X-value.)
If it can be checked, proceed to step 7).
- 5) Perform check and adjustment of the tracking preset. Refer to 3. VTR SECTION ADJUSTMENT in ELECTRICAL ADJUSTMENT for the adjustment method.
- 6) Perform the X-value adjustment.
- 7) Perform the following adjustments, referring to 3. VTR SECTION ADJUSTMENT in ELECTRICAL ADJUSTMENT.
 - Record Luma/Chroma Level Adjustment

Checking the Flatness and Level Fluctuations of FM Output

- 1) Connect an oscilloscope to TP203 on the luma/chroma circuit board.
- 2) Synchronize the oscilloscope with TP202 (SW25) on the luma/chroma circuit board.
- 3) Set the TRACKING control to the centre click position.
- 4) Playback the alignment tape (50HMPE-3C).
- 5) Adjust the voltage level control of the oscilloscope so that the maximum amplitude of the FM output is set to 4 graduations on the monitor of the oscilloscope. (See Fig. 3-16)
- 6) Turn the TRACKING control to set the maximum amplitude of FM output to 3 graduations on the monitor of the oscilloscope. (See Fig. 3-16)
- 7) Check that the minimum amplitude is set to more than 2 graduations at this time. If it cannot be confirmed, fine adjust the height of the guide rollers.

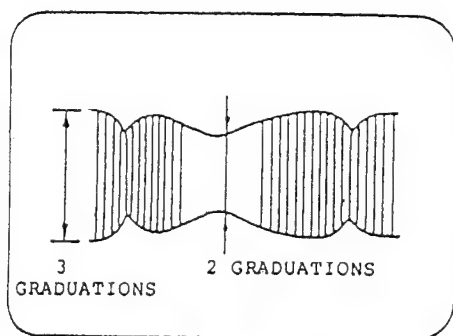


Fig. 3-16

7. TORQUE CONFIRMATION (Fig. 3-17)

Confirm the following before adjusting the torque.

- Check that the take-up brake is compressed against the take-up gear.

7-1. TAKE-UP TORQUE CONFIRMATION

- 1) Load the back-tension/play torque meter and set the unit to the play mode.
- 2) Check that the torque indicated by the right meter is between 40 and 60 g-cm.

7-2. REVERSE-SEARCH TORQUE CONFIRMATION

- 1) Load the back-tension/play torque meter and set the unit to the reverse-search mode.
- 2) Check that the torque indicated by the left meter is more than 60 g-cm.

7-3. REVERSE-SEARCH BRAKE TORQUE CONFIRMATION

- 1) Load the back-tension/play torque meter and set the unit to the reverse-search mode.
- 2) Check that the brake torque indicated by the right meter is between 15 and 35 g-cm.

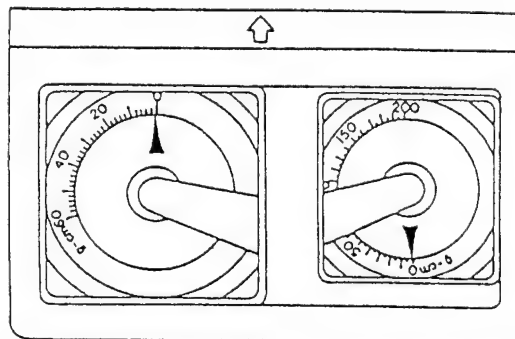


Fig. 3-17

CHAPTER 4 ELECTRICAL ADJUSTMENT

1. CONNECTIONS FOR ADJUSTMENT

Remove the right case and left case as described previously.

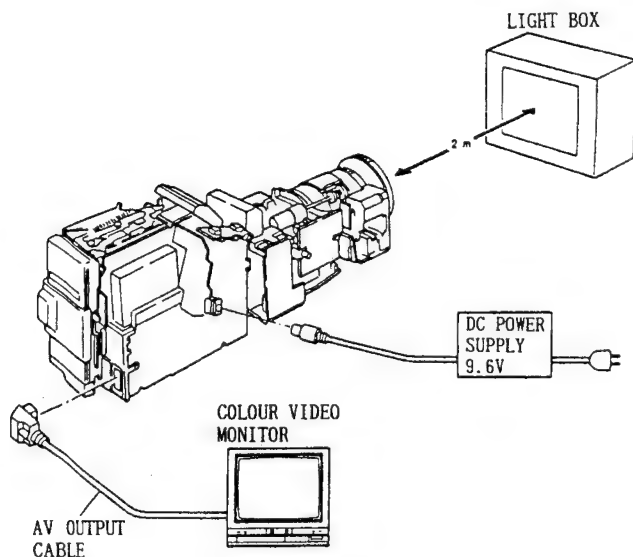


Fig. 4-1

2. CAMERA SECTION ADJUSTMENT

2-1. CIRCUIT BOARD LOCATIONS AND SERVICING POSITION

1. Sensor Circuit Board
2. Control Circuit Board
3. Autofocus Circuit Board
4. Process Circuit Board
5. Titler Circuit Board
6. DC-DC Converter
- A. 14-Pin Extension Cable (Part No. 7099362). Connect the sensor circuit board and process circuit board.
- B. 8-Pin Extension Cable (Part No. 7099361). Connect the sensor circuit board and process circuit board.
- C. 8-Pin Extension Cable (Part No. 7099363). Connect the titler circuit board and control circuit board.

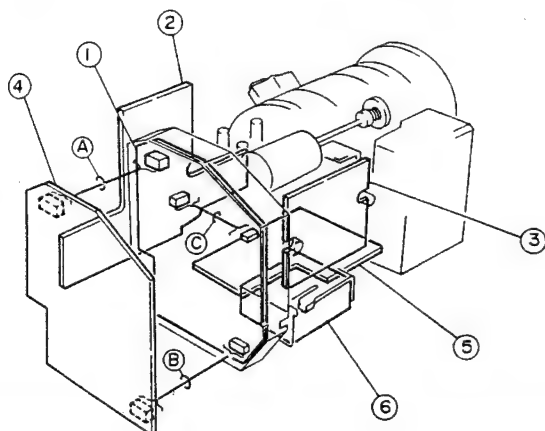


Fig. 4-2

2-2. TEST EQUIPMENT AND CHARTS NECESSARY FOR ADJUSTMENT

- Test Equipment
 - Oscilloscope (dual trace) (Vectorscope)
 - Digital Voltmeter (DVM)
 - Frequency Counter
 - Colour Video Monitor
- Charts, etc.
 - Gray Scale Chart
 - Colour Bar Chart
 - Resolution Chart
 - Backfocus Adjustment Chart
 - Light Box (3100°K)
 - DC Power Supply (9.6 V)
 - DC Power Supply (1.4 V)
 - Electrolytic Capacitor (47 μ F)
 - Backfocus Adjustment Driver
 - Light Balancing Filter C2
 - Light Balancing Filter C8

2-3. ADJUSTMENT CONDITIONS

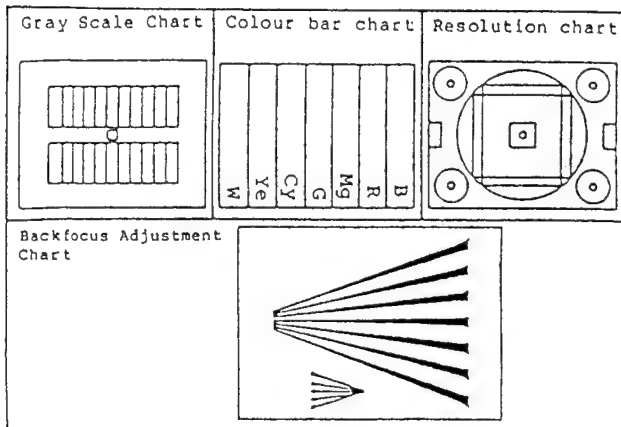
- 1) Check that the VTR section has been adjusted correctly before adjusting the camera section.
- 2) Connect this unit, a power supply and a colour video monitor as shown in Fig. 4-1.
- 3) Place the chart (light box) 2 m away from the camera (lens surface) when otherwise not specified.
- 4) Point the camera at the chart to fill the video period when otherwise not specified.
- 5) Use the 10:1 probe of the oscilloscope when otherwise not specified.
- 6) When "Trigger the oscilloscope internally" is specified, set the time base of the oscilloscope to 10 μ s/div.
- 7) When using TP205 (VIDEO OUT) on the luma/chroma circuit board to perform adjustment, be sure to terminate the AV output jack with 75 ohm.

2-4. PRESET POSITIONS OF SWITCHES AND CONTROLS DURING ADJUSTMENT

Operate	
Slide Cover	"CAM." position
MODE switch	"S" position
Shutter Speed	"50 (1/50 sec)"
Exposure	"0"
FOCUS Switch	"MAN" position
WHITE BAL switch	"MAN" position
WHITE BAL control	"Light Bulb" position
IMAGE switch	"POS" position

2-5. LIST OF CHARTS FOR CAMERA ADJUSTMENT

Table 4-1



2-6. CAMERA ADJUSTMENT

1) Subcarrier Frequency Adjustment (Fig. 4-52)

This adjustment set for frequency adjustment of subcarrier.

Test Point: TP203 **Process**
Adjust: CT205-1 (Fo ADJ) **Process**
Observe: Frequency Counter

1. Connect the frequency counter to TP203.
2. Adjust CT205-1 (on the IC205) for $4.433619\text{MHz} \pm 20\text{Hz}$.

Note: Be careful when applying an adjustment driver to CT205-1 because the stray capacitance of the driver may vary the frequency.

2) VCO Lock Adjustment (Fig. 4-52)

Test Point: TP202 **Process**
Adjust: CT205-2 (VCO LOCK) **Process**
Observe: DVM

1. Connect the DVM to TP202.
2. Adjust CT205-2 (on the IC205) for $3.2\text{V} \pm 0.1\text{V}$.

Note: Be careful when applying an adjustment driver to CT205-2 because the stray capacitance of the driver may vary the voltage. Use non-metallic adjustment tool.

3) Drive Pulse Frequency Adjustment (Fig. 4-51)

This adjustment sets the drive pulse frequency to the specified value.

Test Point: TP101 **Sensor**
Adjust: CT101 (DRIVE CLOCK Fo) **Sensor**
Observe: DVM

1. Connect the DVM to TP101.
 2. Adjust CT101 for $3.0\text{V} \pm 0.1\text{V}$.
- Note: Be careful when applying an adjustment driver to CT101 because the stray capacitance of the driver may vary the voltage. Use non-metallic adjustment tool.

4) Sensor Sub Voltage Adjustment (Fig. 4-3, 4-51)

This adjustment sets the sensor sub-

voltage. If this adjustment is incomplete, blooming and surface roughness appear in the picture.

Test Point: TP102 **Sensor**
Adjust: RT101 (SENSOR SUB VOLTAGE) **Sensor**
Observe: DVM

1. Set the shutter speed to 60 (1/60 sec).
2. Check the code on the back of the image sensor.
3. Connect the DVM to TP102.
4. Adjust RT101 according to Table 4-2 to set the voltage at TP102.

Table 4-2

CODE	E	F	G	H	J	K	L	M
VOLTAGE	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5
CODE	N	P	Q	R	S	T	U	V
VOLTAGE	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5
CODE	W	X	Y	Z				
VOLTAGE	17.0	17.5	18.0	18.5				

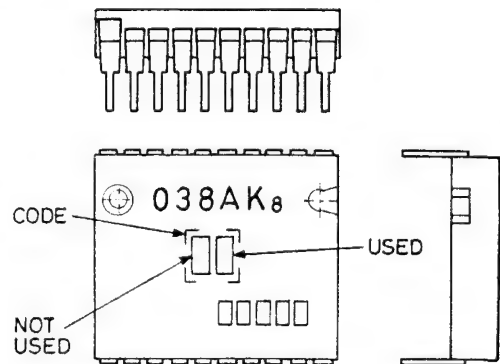


Fig. 4-3

5) Professional AE Adjustment (Fig. 4-52)

Note: Perform this adjustment while the camera is disconnected from the VTR (PG207).

This adjustment sets the switching points of the shutter speed and F number. If this adjustment is incomplete, the professional AE does operate normally.

Test Point: TP204 **Process**
TP201-2 **Process**
TP201-3

Adjust: RT201 (AE OFFSET) **Process**
RT202 (AE GAIN) **Process**
RT203 (AE HALL CURRENT) **Process**
Observe: DVM

Note: When the iris is opened :

Apply DC 5V to PG207-13.

When the iris is closed ;

Do not apply DC 5V to PG207-13.

1. Connect the DVM to TP204.
2. Adjust RT201 so the voltage at TP204 is 2V. This is a reference value in the following adjustments.

3. Connect the DVM to TP201-3.
4. Adjust RT202 so the difference in the voltage at TP201-3 is 6V when the iris is opened and closed.
5. Measure the voltage at TP201-3 when the iris is opened.
If it is 7.5V or less, proceed to step 6. If it is higher than 7.5V, adjust RT201 to decrease the voltage at TP204 slightly and then perform readjustment from step 2.
6. Measure the voltage at TP201-3 when the iris is closed. If it is 0.55V or higher, proceed to step 7. If it is less than 0.55V, adjust RT201 to increase the voltage at TP204 slightly and then perform readjustment from step 2.
7. Adjust RT201 so the voltage at TP201-3 is 7V when the iris is opened.
8. Adjust RT201 and RT202 so the voltage at TP201-3 is 7V when iris is opened and 1V when it is closed.
9. Connect the DVM to TP201-2.
10. Adjust RT203 so the voltage at TP201-2 is 0.3V when the iris is opened.
11. Check that the voltage at TP201-2 is between 6.5V and 7.1V when the iris closed.

6) Backfocus Adjustment (Fig. 4-4)

The purpose of this adjustment is to ensure proper focus tracking throughout the zoom range.

Adjust: BACKFOCUS ADJUSTMENT POINT
(BACKFOCUS LENS)

Observe: Colour Video Monitor

1. Position the camera section two (2) meters from the backfocus adjustment chart and illuminate the object with approximately 100 lux.
2. Set the zoom to wide-angle end and set the index on the focus ring to two (2) meters.
3. Loosen the relay lens retaining screw.
4. Insert the backfocus adjustment driver into the backfocus adjustment hole and turn it to the left and right to optimize the focus.
5. Set the zoom to telephoto end and check that the chart is in focus. If it is not focused, set the zoom to wide-angle and readjust step 4.
6. Adjust so the chart is approximately in focus at both the wide-angle and telephoto ends with the focus ring set to two (2) meters.

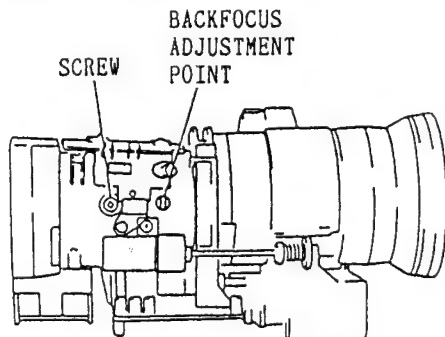


Fig. 4-4

Note: After adjustment is completed, tighten the relay lens retaining screw and fix it with locking paint.

7) Luminance Setup Adjustment (Figs. 4-5, 4-52)

This adjustment sets the brightness of the picture.

Test Point:

TP205 (VIDEO OUT)

Luma/Chroma

Adjust:

RM201-2 (LUMA SETUP)

Process

Observe: Oscilloscope

1. Cap the lens.
2. Connect the oscilloscope to TP205.
3. Trigger the oscilloscope internally.
4. Adjust RM201-2 for 35mV \pm 15mV from the blanking level to the centre of the waveform.

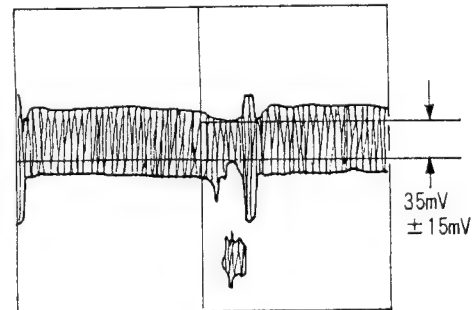


Fig. 4-5

8) AIC Level Adjustment (Figs. 4-6, 4-52)

This adjustment sets the balance point of the auto iris control.

Test Point:

TP205 (VIDEO OUT)

Luma/Chroma

Adjust: RM201-3 (AIC)

Process

Observe: Oscilloscope

1. Aim the camera at the gray scale chart.
2. Connect the oscilloscope to TP205.
3. Trigger the oscilloscope internally.
4. Adjust RM201-3 for 700mVp-p \pm 15mV from the blanking level to the centre of the white level on the gray scale.

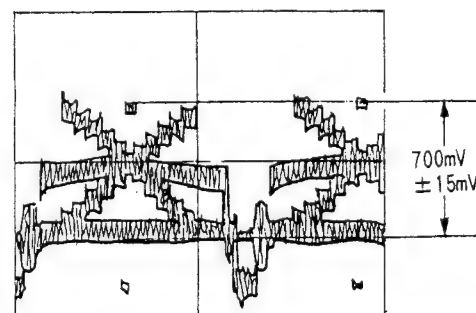


Fig. 4-6

9) Matrix Adjustment (Figs. 4-7, 4-52)
This adjustment corrects for unevenness in tint.

Test Point: TP201-8 Process
Adjust: RM202-1 (MATRIX) Process
Observe: Oscilloscope

1. Aim the camera at the colour chart.
2. Connect the oscilloscope to TP201-8.
3. Trigger the oscilloscope internally.
4. Adjust RM202-1 so that the blue level becomes $50\% \pm 10\%$ of the white level.

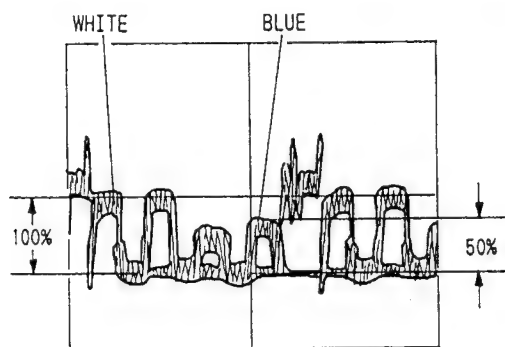


Fig. 4-7

6. Adjust RM202-5 for minimum carrier in the waveform.
7. Remove the ground (TP201-10) connections from TP201-7 and TP201-8.
8. Adjust RM201-1 and RM202-4 for minimum carrier in the waveform.
9. Set the MODE switch to the "S" position (Shutter Speed: 1/50, Exposure: 0).

Adjustment using the vectorscope
See Page 4-7.

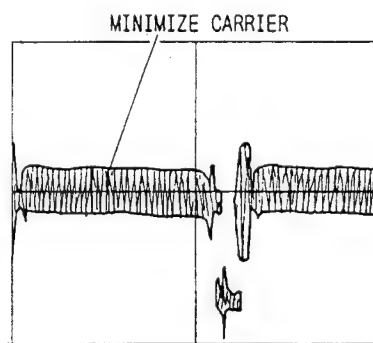


Fig. 4-8

10) White Balance Control Position Adjustment

Test Point: TP201-9 Process
Adjust: WHITE BAL control
Observe: DVM

1. Confirm that the WHITE BAL switch is in the MAN position.
2. Connect the DVM to TP201-9.
3. Adjust WHITE BAL control, location on the left side of the case, for $1.4V \pm 0.05V$.

Note: White balance control position adjustment is required prior to performing black balance, white balance adjustment, burst level adjustment.

11) Black Balance Adjustment

(Figs. 4-8, 4-52)

This adjustment sets the proper black balance of the picture.

Test Point: TP205 (VIDEO OUT) Luma/Chroma
Adjust:
RM201-1 (BLU SETUP) Process
RM202-4 (RED SETUP) Process
RM202-5 (GRN SETUP) Process
Observe: Oscilloscope
 Vectorscope

Adjustment using the oscilloscope
(Fig. 4-8)

1. Cap the lens.
2. Set the MODE switch to the "M" position.
3. Connect the oscilloscope to TP205.
4. Trigger the oscilloscope internally.
5. Connect TP201-7 (RED) and TP201-8 (BLU) to ground (TP201-10).

12) White Balance Adjustment

(Figs. 4-9, 4-52)

This procedure sets the correct red and blue signal levels for proper white balance circuit operation.

Test Point: TP205 (VIDEO OUT) Luma/Chroma
Adjust: RM202-2 (RED GAIN) Process
 RM202-3 (BLU GAIN) Process
Observe: Oscilloscope
 Vectorscope

Adjustment using the oscilloscope
(Fig. 4-9)

1. Aim the camera at the gray scale chart.
2. Connect the oscilloscope to TP205.
3. Trigger the oscilloscope internally.
4. Adjust RM202-2 and RM202-3 to minimize the carriers at each step of the waveform.

Adjustment using the vectorscope
See Page 4-7.

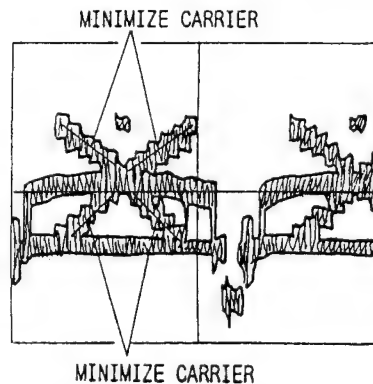


Fig. 4-9

13) Burst Level Confirmation (Figs. 4-10, 4-52)

Test Point:
TP205 (VIDEO OUT) Luma/Chroma
Observe: Oscilloscope

1. Aim the camera at the gray scale chart.
2. Connect the oscilloscope to TP205.
3. Trigger the oscilloscope internally.
4. Confirm that the burst level is in the $300\text{mV} \pm 30\text{mV}$.

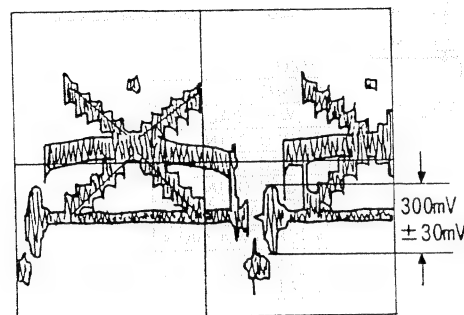


Fig. 4-10

14) Auto White Balance Adjustment (Figs. 4-11, 4-52)

This adjustment sets the auto white balance performance.

Test Point:
TP205 (VIDEO OUT) Luma/Chroma
Adjust: RM201-4 (WHT BAL) Process
Observe: Oscilloscope
Vectorscope

Adjustment using the oscilloscope (Fig. 4-16)

1. Set the WHITE BAL switch to the AUTO position.
2. Attach the light balancing filter C10 (C8 + C2) over the lens.
3. Aim the camera at the gray scale chart.
4. Connect the oscilloscope to TP205.
5. Trigger the oscilloscope internally.
6. Adjust RM201-4 to minimize the carriers at each step of the waveform.

Adjustment using the vectorscope See Page 4-7.

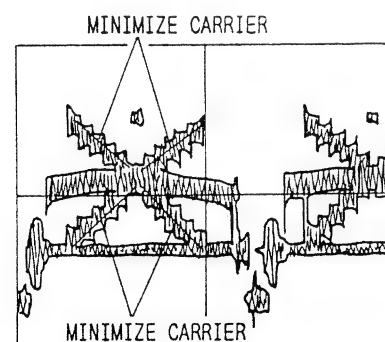


Fig. 4-11

15) Chroma Level Adjustment (Figs. 4-12, 4-52)

This adjustment sets the chroma level.

Test Point:
TP205 (VIDEO OUT) Luma/Chroma

Adjust: RM201-5 (CHROMA LEVEL) Process
Observe: Oscilloscope
Vectorscope

Adjustment using the oscilloscope (Fig. 4-14)

1. Set the WHITE BAL switch to the AUTO position.
2. Attach the light balancing filter C10 (C8 + C2) over the lens.
3. Aim the camera at the colour chart.
4. Connect the oscilloscope to TP205.
5. Trigger the oscilloscope internally.
6. Adjust RM201-5 so that the red level becomes $140\% \pm 10\%$ of the burst level.

Adjustment using the vectorscope See Page 4-7

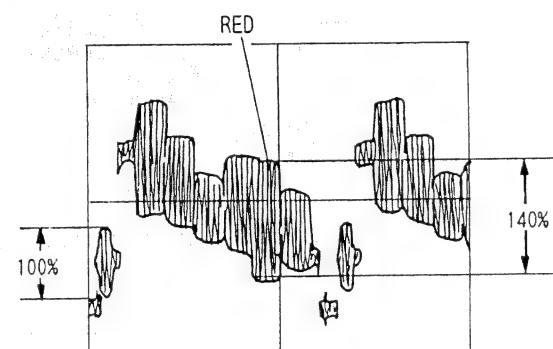


Fig. 4-12

2-7. ELECTRONIC VIEWFINDER (EVF) ADJUSTMENT

1) Deflection Yoke Position Adjustment (Fig. 4-13)

This adjustment procedure eliminates picture tilt on the EVF display.

Adjust: Deflection yoke
Observe: EVF Display

1. Align the camera with the resolution chart making sure that both the camera and the chart are on the same plane.
2. Loosen the screw holding the deflection yoke.
3. Turn the deflection yoke so that the EVF picture (chart) is horizontal, matching the edges of the CRT.

Note: After adjustment is completed, tighten the deflection yoke retaining screw.

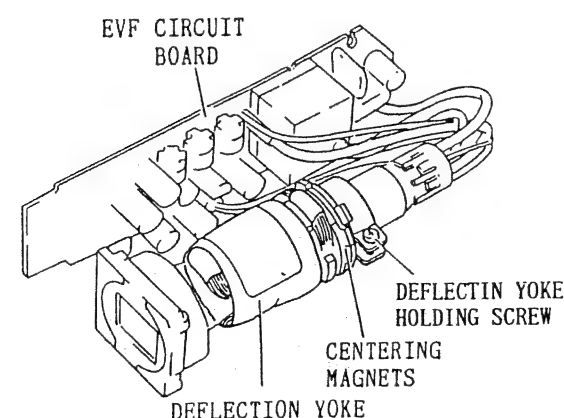


Fig. 4-13

2) EVF Centring Adjustment (Fig. 4-13)

This adjustment centres the image observed by the camera in the EVF display.

Adjust: Centring Magnets
Observe: EVF Display

1. Aim the camera at the resolution chart and align the centre of the chart with the centre of the camera lens.
2. Remove the locking paint from the centering magnets.
3. Adjust the centering magnets until the centre of the picture viewed by the camera is positioned in the centre of the EVF Display.

Note: After adjustment is completed, fix the centering magnets with lock paint.

3) EVF Vertical Size Adjustment (Fig. 4-53)

This adjustment determines the vertical size of the image appearing in the EVF display.

Adjust: RT802 (V. SIZE) EVF
Observe: EVF Display

1. Aim the camera at the resolution chart, and line up the reference arrow head with the edge of the raster in the EVF.
2. Adjust RT802 so that the top and bottom edges of the chart match the top and edges of the CRT.

4) EVF Brightness Adjustment (Fig. 4-53)

This adjustment sets the brightness of the picture in the EVF display.

Adjust: RT805 (BRIGHT) EVF
Observe: EVF Display

1. Aim the camera at the gray scale chart.
2. Adjust RT805 to optimize the EVF picture.

5) EVF Focus Adjustment (Fig. 4-53)

This control adjusts for optimum focus of the electronic viewfinder picture.

Adjust: RT803 (FOCUS) EVF
Observe: EVF Display

1. Aim the camera at the resolution chart.
2. Adjust RT803 so that the EVF picture is clear.

2-8. AUTOFOCUS ADJUSTMENT

1) Sensor Position Adjustment (Fig. 4-14)

Adjust: Sensor Adjustment Screw
Observe: Colour Video Monitor

1. Position the camera section two (2) meters from the backfocus adjustment chart and illuminate the object with approximately 100 lux.
2. Remove the autofocus adjustment cap.
3. Set the index on the focus ring to two (2) meters. Check that the chart is

in focus. If it is not in focus, readjust the backfocus.

4. Set the zoom to telephoto end.
5. Set the FOCUS switch to AUTO position.
6. Operate the autofocus from the telephoto end to the wide-angle end and check that the chart is in focus with the index at two (2) meters.
7. If the chart is not in focus, turn the Sensor Adjustment Screw so the index on the focus ring is two (2) meters.

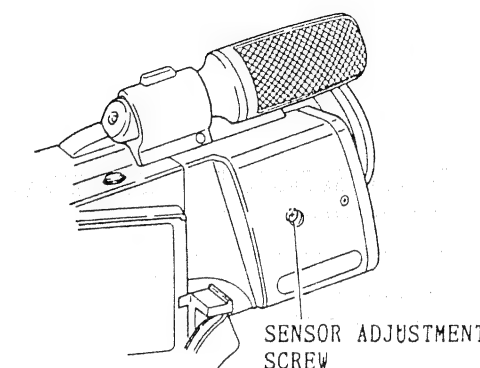


Fig. 4-14

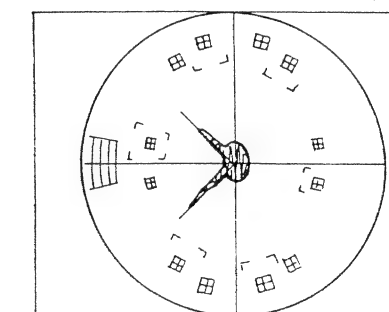


Fig. 4-15

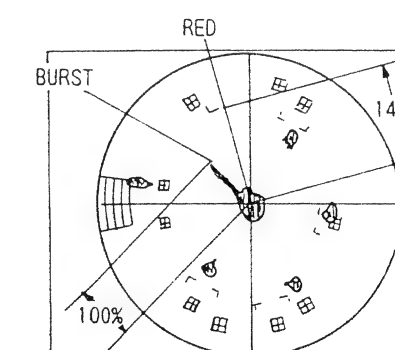


Fig. 4-16

2-9. ADJUSTMENT USING THE VECTORSCOPE

Note 1: Use the video output jack as the test point for all adjustments.
Note 2: Terminate the vectorscope with 75 ohm or connect the vectorscope to the video output jack terminated with 75 ohm.

ITEM No.	ADJUSTMENT NAME	SUBJECT	ADJUSTMENT POINT	PROCEDURE	Fig. No.
11)	Black Balance Adjustment	Lens Cap	RM201-1 RM202-4 RM202-5	1. Connect TP201-7 and TP201-8 to GND (TP201-10). 3. Adjust RM202-5 so that the bright spot is positioned at the centre. 4. Remove the ground (TP201-1) connections from TP201-7 and TP201-8. 5. Adjust RM201-1 and RM202-4 so that the bright spot is positioned at the centre.	4-15 4-15
12)	White Balance Adjustment	Gray Scale	RM202-2 RM202-3	1. Adjust RM202-2 and RM202-3 so that the bright spot is positioned at the centre.	4-15
14)	Auto White Balance Adjustment	Gray Scale	RM201-4	1. Set the WHITE BAL switch to the AUTO position. 2. Attach the light balancing filter C10 (C8 + C2) over the lens. 3. Adjust RM201-4 so that the bright spot is positioned at the centre.	4-15
15)	Chroma Level Adjustment	Colour Bar	RM201-5	1. Set the WHITE BAL switch to the AUTO position. 2. Attach the light balancing filter C10 (C8 + C2) over the lens. 3. Adjust RM201-5 so that the red vector is equal to more than 140% \pm 10% when compared to the burst level.	4-16

2-10. ADJUSTMENT COMPONENTS LOCATIONS

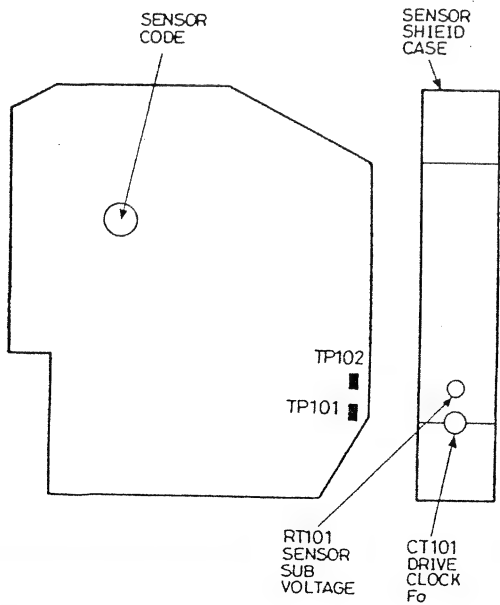


Fig. 4-51 Sensor Circuit Board (Solder Side)

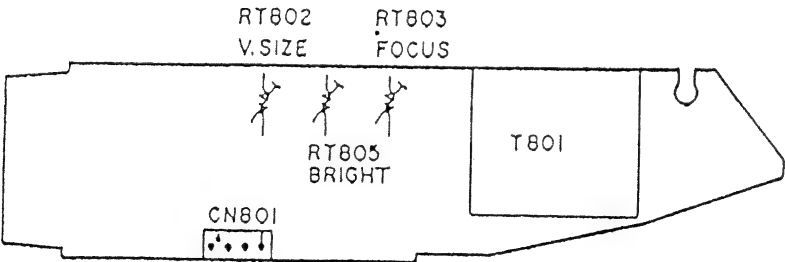


Fig. 4-53 Electronic Viewfinder Circuit Board (Components Side)

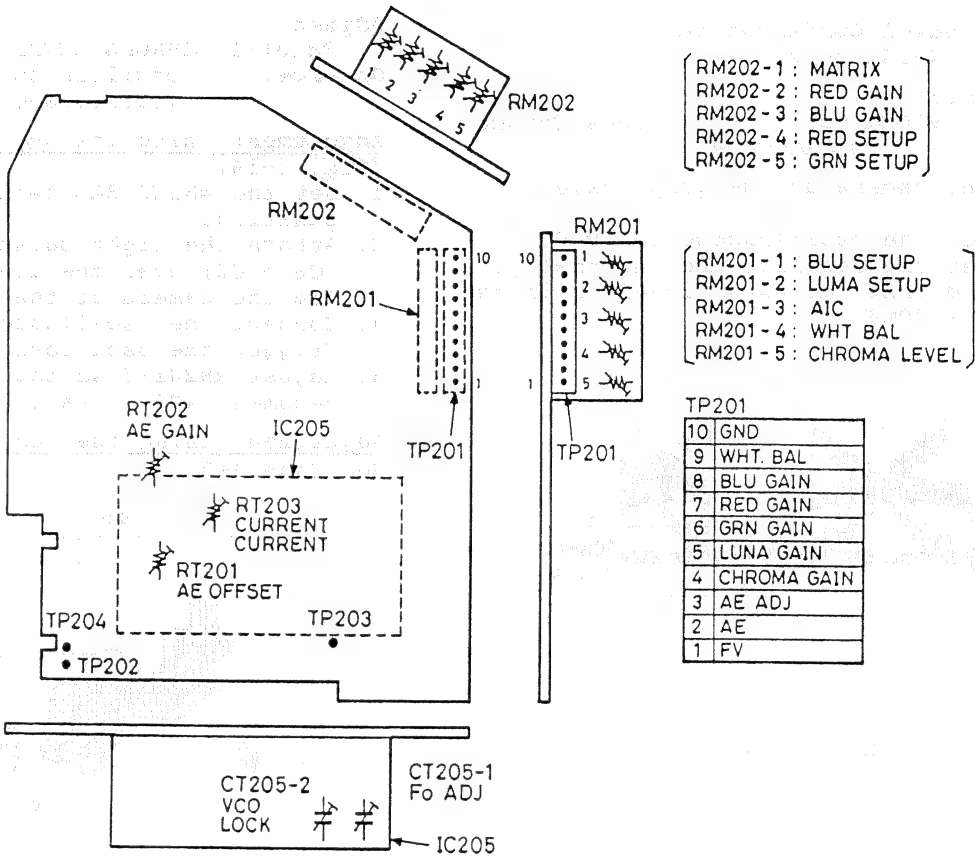


Fig. 4-52 Process Circuit Board (Solder Side)

3. VTR SECTION ADJUSTMENT

3-1. CIRCUIT BOARD LOCATIONS AND SERVICING POSITIONS

Remove the right case and left case as described previously. Also remove the dew sensor from the A/C head base. (When the connector of the dew sensor is disconnected from the main circuit board, the unit enters the state in which condensation has been detected and the dew sensor is disabled.)

1. Motor Drive Circuit Board
2. Preamp Circuit Board
3. Luma/Chroma Circuit Board
4. Battery Jack Circuit Board (IC401)
5. Main Circuit Board
6. Zoom Switch
7. Function Switch
8. FM Audio Circuit Board
- A. 30-Pin Extension Cable (Part No. 7099311). Connect the motor drive circuit board and main circuit board.
- B. 16-Pin Extension Cable (Part No. 7099359). Connect the luma/chroma circuit board and preamp circuit board.
- C. 14-Pin Extension Cable (Part No. 7099360). Connect the main circuit board and FM audio circuit board.

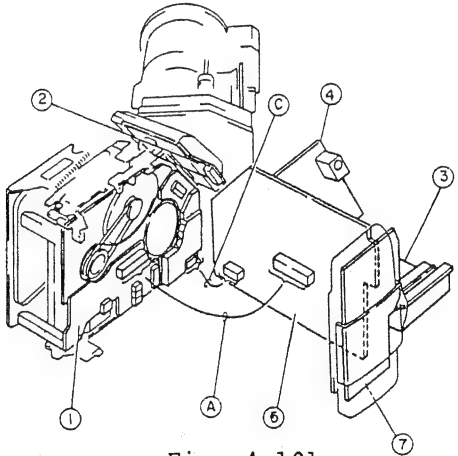


Fig. 4-101

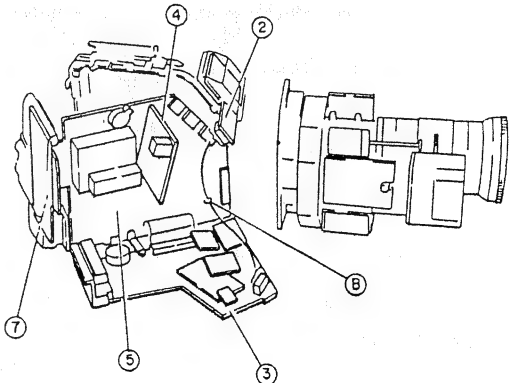


Fig. 4-102

3-2. TEST EQUIPMENT AND ALIGNMENT TAPES NECESSARY FOR ADJUSTMENT

- Test Equipment
 - Oscilloscope (dual trace)
 - Digital Voltmeter (DVM)
 - Millivoltmeter
 - Frequency Counter
 - Colour Video Monitor
- Alignment Tape and Charts, etc.
 - Alignment Tape (50HMBE-3C)
 - Alignment Tape (50HMPE-3C)
 - Alignment Tape (HMAE-3C)
 - Blank Tape
 - S-VHS Blank Tape
 - Colour Bar Chart
 - 3100°K Light Box
 - DC Power Supply (9.6V)
 - Semi-Variable Resistor Adj Driver

3-3. ADJUSTMENT CONDITIONS

- 1) Connect this unit, a power supply and a colour video monitor as shown in Fig. 4-1.
- 2) Before adjusting the VTR section, check that the camera section has been adjusted correctly.
- 3) Point the camera at the chart to fill the video period when otherwise not specified.
- 4) Use the 10:1 probe of the oscilloscope when otherwise not specified.
- 5) When "REC mode" is specified, set the operate slide cover to CAM position and press the VTR start button on the battery jack circuit board (IC401) or autofocus circuit board.

3-4. PRESET POSITIONS OF SWITCHES AND CONTROLS DURING ADJUSTMENT

Operate
 Slide Cover "VTR" position
 TRACKING control Centre Position
 TAPE SPEED switch "SP" position
 S-VHS switch "OFF" position
 MODE switch "S" position
 Shutter Speed "50 (1/50 sec)"
 Exposure "0"
 FOCUS Switch "MAN" position
 WHITE BAL switch "AUTO" position
 IMAGE switch "POS" position

3-5. SYSTEM CONTROL SECTION

1) Display Position Adjustment (Figs. 4-103, 4-151)

This adjustment regulates the horizontal width of the character display on the screen.

Adjust: CT801 (DISPLAY POSITION) Main
Observe: Colour Video Monitor

1. Load the instrument with an alignment tape (50HMPE-3C) and play it back the monoscope video signal.
2. Press the COUNTER/TAPE REMAIN button to display the tape speed on the monitor screen.
3. Adjust CT801 so that remaining tape speed (SP) is positioned on the monitor screen as shown in Fig 4-103.

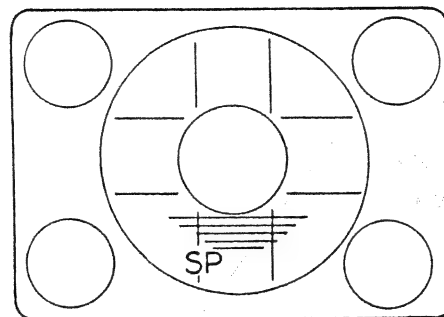


Fig. 4-103

3-6. SERVO SECTION

1) Head Switching Point Adjustment (Figs. 4-104, 4-151, 4-152)

The pulse generator shifter determines the video head switching point during playback. Misadjustment of pulse generator shifter may cause head switching noise in the picture and/or vertical instability.

Test Point: TP205 (VIDEO OUT) Luma/Chroma
Adjust: RT602 (PG SHIFTER) Main
Observe: Oscilloscope

1. Load the instrument with an alignment tape (50HMBE-3C) and play it back the colour bar signal.
2. Connect the oscilloscope to TP205 (0.5V/50μsec.cm).
3. Trigger the oscilloscope at SW 25Hz. (Use TP202 on the luma/chroma circuit board.)
4. Set the oscilloscope to (-) slope and adjust RT602 so that the trailing edge of the SW 25Hz signal is placed $7.5H \pm 0.5H$ (horizontal) lines before the start of CH-1 vertical sync.
5. Set the oscilloscope to (+) slope and confirm the leading edge of the SW 25Hz signal is $7.5H \pm 0.5H$ (horizontal) lines before the start of CH-2 vertical sync.

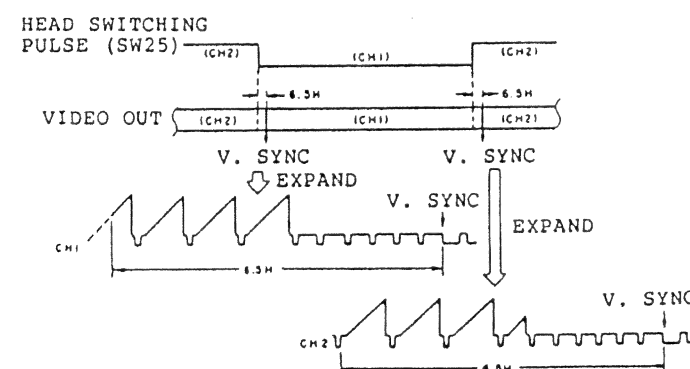


Fig. 4-104

2) Tracking Preset Adjustment (Figs. 4-105, 4-151, 4-152)

This adjustment is performed to obtain correct tracking during playback of a

tape recorded on the same instrument. When this adjustment is incomplete, noise may be conspicuous with the tracking control placed in the detent position or noise may not be removed by the tracking control.

Test Point: TP205 (VIDEO OUT) Luma/Chroma
 PG601-1 Main

Adjust: RT601 (TRACKING PRESET) Luma/Chroma
Observe: Oscilloscope

1. Set the TRACKING control to the mechanical centre (centre click) position.
2. Aim the camera at the colour bar chart.
3. Using a blank tape, make a recording and play it back.
4. Connect PG601-5 to PG605-6.
5. Connect CH-1 of the oscilloscope to TP205 (5V/0.5msec.cm).
6. Connect CH-2 of the oscilloscope to PG601-1 (1V/0.5msec.cm).
7. Trigger the oscilloscope at SW 25Hz. (Use TP202 on the luma/chroma circuit board.)
8. Set the oscilloscope to the (-) slope.
9. Adjust RT602 so that the CTL pulse and vertical sync of the video signal match.
10. Remove the PG601-5 connections from PG601-6.

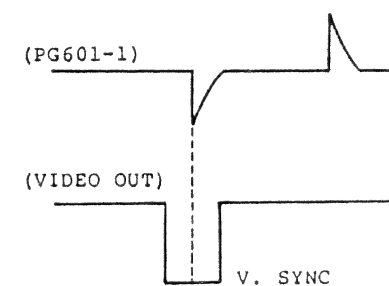


Fig. 4-105

3-7. LUMA/CHROMA SECTION

1) Record Luma/Chroma Level Adjustment (Figs. 4-106, 4-107, 4-152, 4-153)

Optimum record colour level is regulated by this adjustment. If the record chroma level is too high, diamond beats can be seen in the screen. If the levels is too low, the colour is degraded.

Test Point: TP101 Preamp
Adjust: RT202 (REC CHROMA LEVEL) Luma/Chroma
 RT201 (REC LUMA LEVEL) Luma/Chroma

- Observe:** Oscilloscope
1. Aim the camera at the colour bar chart.
 2. Connect the oscilloscope to TP101. (Use the shield cover of the preamp circuit board as ground.) (50mV/5msec.cm)
 3. Trigger the oscilloscope at SW 12.5Hz. (Use TP201 on the luma/chroma circuit board.)

4. Set the operate slide cover to the CAM. position.
5. Set the S-VHS switch to the AUTO position.
6. Set the TAPE SPEED switch to the LP position.
7. Load the instrument with a S-VHS blank tape.
8. Place the instrument in the "REC" mode.
9. Adjust RT201 to minimize the record luminance level.
10. Adjust RT202 so that the record chroma level is $22.5mV \pm 2.5mV$.
11. Adjust RT201 so that the record luminance level is $130mV \pm 5mV$.
12. Set the operate slide cover to the VTR position.
13. Set the S-VHS switch to the OFF position.
14. Set the TAPE SPEED switch to the SP position.

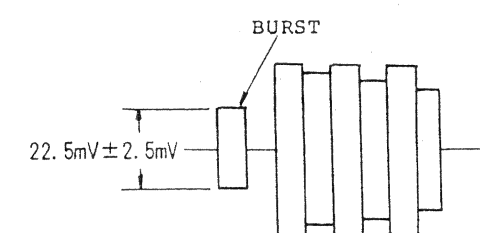


Fig. 4-106

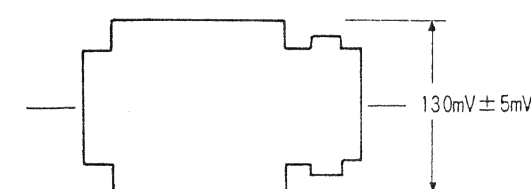


Fig. 4-107

2) LH Delay Line Output Level

Adjustment (Figs. 4-108, 4-152) This adjustment makes the input and output levels of the LH delay Line the same. If this adjustment is incomplete, switching noise is conspicuous when dropout is compensated.

Test Point: IC201-10 Luma/Chroma
Adjust: RT203 Luma/Chroma
 (LH DELAY LINE OUTPUT LEVEL)
Observe: Oscilloscope

1. Load the instrument with an alignment tape (50HMBE-3C) and play it back the colour bar signal.
2. Connect the oscilloscope to IC201-10. (0.2V/5msec.cm).
3. Trigger the oscilloscope at SW 25Hz. (Use TP202 on the luma/chroma circuit board.)
4. Adjust RT203 to minimize noise at the waveform.

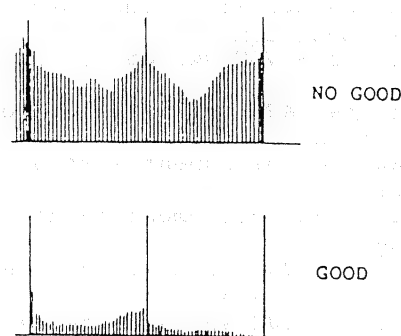


Fig. 4-108

3-8. AUDIO SECTION

1) Audio Bias Level Adjustment (Fig. 4-151)

This adjustment optimizes the audio record bias. When the audio record bias is too low, high frequencies are increased resulting in distortion. When the level is too high, high frequencies are attenuated.

Test Point: TP401 Main
TP402 Main

Adjust: RT401 (AUDIO BIAS LEVEL) Main
Observe: Millivoltmeter

Note: Perform this adjustment without applying an audio signal.

1. Connect the millivoltmeter to TP401. (Use TP402 as ground.)
2. Set the operate slide cover to the CAM position.
3. Set the S-VHS switch to the AUTO position.
4. Load the instrument with a S-VHS blank tape.
5. Place the instrument in the "REC" mode.
6. Adjust RT401 for $2.2\text{mV} \pm 0.1\text{mV}$.

2) Record FM Audio Level Adjustment (Figs. 4-151, 4-154)

Test Point: TP001 FM Audio

Adjust: RT502 (FM AUDIO REC LEVEL) Main
Observe: Oscilloscope

1. Connect the oscilloscope to TP001.
2. Set the operate slide cover to the CAM position.
3. Set the S-VHS switch to the AUTO position.
4. Load the instrument with a S-VHS blank tape.
5. Place the instrument in the "REC" mode.
6. Adjust RT502 for $210\text{mV} \pm 10\text{mV}$.

3-9. ADJUSTMENT COMPONENTS LOCATIONS

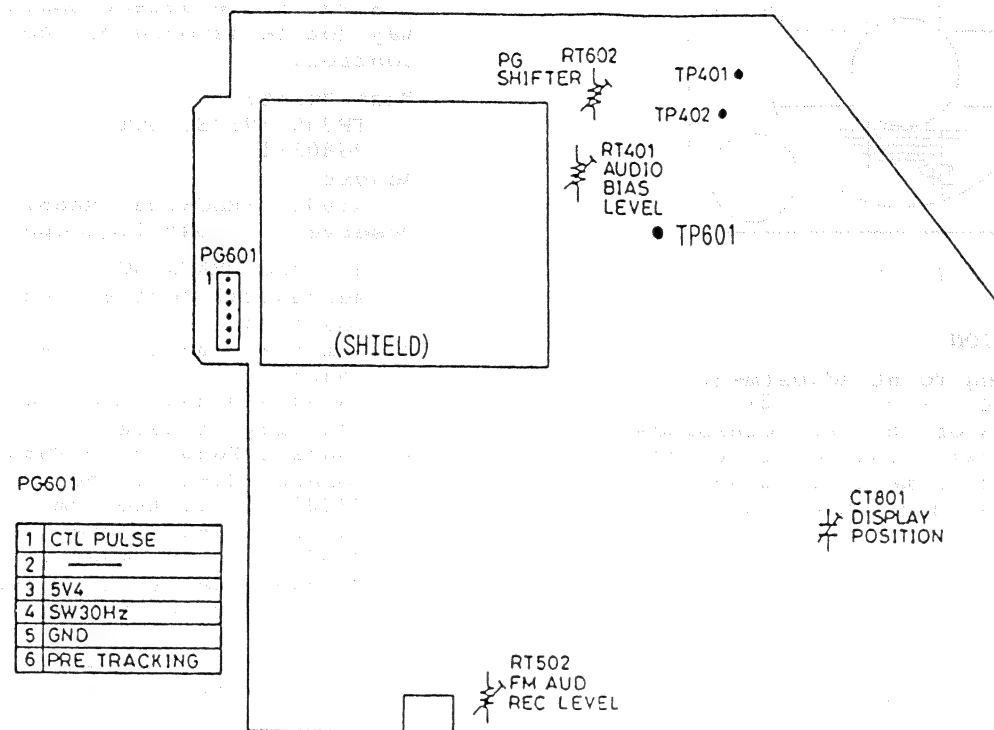


Fig. 4-151 Main Circuit Board
(Components Side)

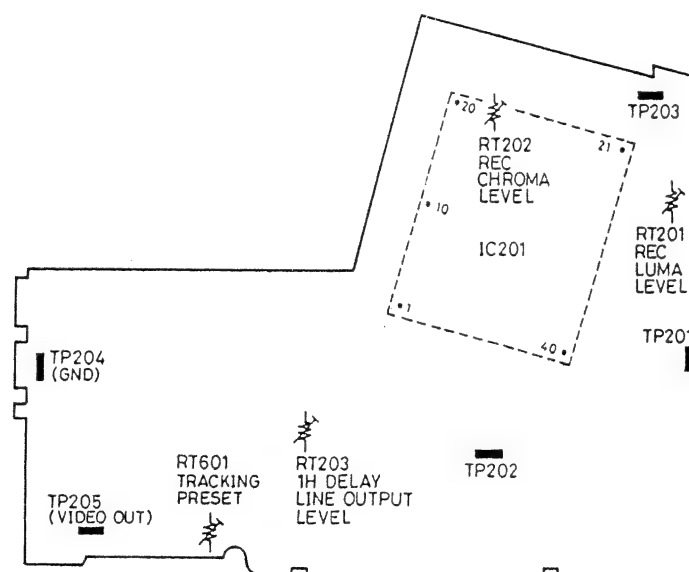


Fig. 4-152 Luma/Chroma Circuit Board
(Solder Side)

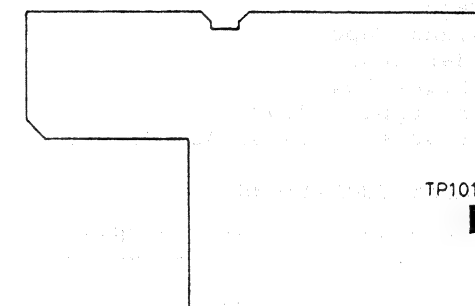


Fig. 4-153 Preamp Circuit Board
(Solder Side)

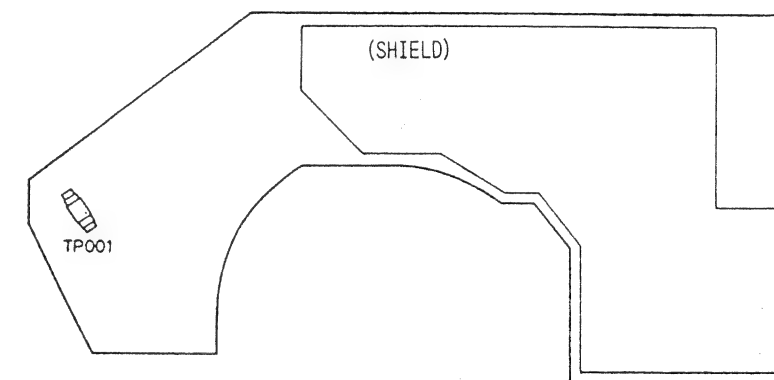


Fig. 4-154 FM Audio Circuit Board
(Components Side)

CHAPTER 5 SCHEMATIC DIAGRAMS AND CIRCUIT BOARD DIAGRAMS

WHEN USING THIS SERVICE REFERENCE MATERIAL

1. Markings in Schematic and Circuit Board Diagrams

- (1) Parts with marks "■" attached to circuit numbers in the schematic and circuit board diagrams are discrete components.
- (2) Parts with marks ② in the circuit board diagrams are leadless jumpers.

2. How to Read Abbreviations

Values, dielectric resistances (power capacitances), tolerances, grades of resistors (excluding variable resistors, etc.) and capacitors are indicated in the schematic diagrams using abbreviations. Collate these abbreviations and the following tables for reading abbreviations to replace parts correctly.

2-1. Resistors

	Value	No indication ohm K kohm
	Tolerance	No indication +5% K +10% M +20%
	Power capacitance	No indication 1/8W (All capacitances other than 1/8W are indicated in schematic diagrams with W omitted)
	Type	No indication .. Carbon film fixed RC Carbon solid RW Power-type wire-wound solid RS Metal oxide film solid RN Metal film solid
Example R210 150K 150 kohm, carbon solid RC.1/2.K 1/2W, +10%		

2-2. Capacitors

	Value	No indication μF P PF
	Dielectric resistance	No indication 50WV (All resistances other than 50WV and those of electrolytic capacitors are indicated with WV omitted.)
	Tolerances	No indication +10% J +5% M +20% C ±0.25PF Z +80%/-20% (No indication with electrolytic capacitors (excluding tantalum and high stability electrolytic capacitors))
	Type	No indication .. Ceramic, general electrolytic (see circuit symbol to distinct from ceramic) MYL Mylar (Polyester film) STY Styrol TA Tantalum KU High stability electrolytic MP Metalized paper
Example C210 0.01/25 Mylar, 0.01μF, 25WV MYL.J +5%		

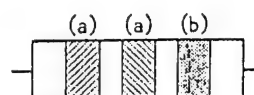
3. How to Read Capacitance of Resistance-Type Capacitors and Coils

3-1 Capacitors

Color	Related voltage
Pink	25V
Light-green	50V

Color	Capacitance (a)	Multiplier (b)	Tolerance (c)	Characteristics (d)
Black	0	10 ⁰	±20%	For temperature compensation
Brown	1	10 ¹		
Red	2	10 ²		
Orange	3	10 ³		
Yellow	4	10 ⁴		
Green	5	10 ⁵		
Blue	6	10 ⁶		
Purple	7			
Gray	8		±30%	High permittivity type
White	9			For temperature compensation
Gold			±5%	
Silver			±10%	

3-2 Coils



4. Cautions on Use of MOS ICs

- (1) MOS ICs are inserted in black foam for shipment. This foam is a conductor which short-circuits between the leads to prevent damage. Do not remove ICs from this foam during storage. Avoid removing ICs from this foam, placing them on plastic which is likely to be charged with static electricity or inserting them into styrol foam.
- (2) High voltages may be applied during soldering caused by leakages from the soldering iron, so be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
- (3) The human body and clothes made of synthetic fibres or nylon gloves may be charged with several thousands volts of static electricity because of friction, so workers should be grounded.
- (4) Be sure to ground measuring instruments such as oscilloscopes, VTVMs, etc. used for repairs.

5. Measure the voltages at each section with the negative side of power supply as a reference.

The voltages in the camera section are measured with the VTR in the record mode, and those in the VTR section are measured in the record and playback modes.

- * Voltages in () are in the record mode.
- * One voltage value is common for recording and playback.

LEADLESS COMPONENT IDENTIFICATION

1. Leadless Transistors

The leadless transistor number is indicated by a code on its surface, using one letter, one letter and one numeral, two letters, two letters and one numeral, two numerals, two numerals and one letter, or three letters.

Letter	Transistor Number	Letter	Transistor Number
A	2SB709	H	2SA1036K
A(R)	2SB1218R(AR)	I	2SB792
A(S)	2SB766S(AS)	J	2SC2735
A(J)	2SB1000J(AJ)	K	2SA1036
B	2SC1621	K(P)	2SC2413P(KP)
B(J)	2SB1001J(BJ)	L	2SC2462
B(R)	2SC4081R(BR)	M	2SA1052
B(R)	2SC2412AR(BR)	N	2SC1653
B(S)	2SC2412KS(BS)	N(E)	2SD1306E(NE)
C	2SA1122	P	2SD814
C(L)	2SD999L(CL)	P(E)	2SA1171E(PE)
C(R)	2SB710R(CR)	Q	2SC2620
C(R)	2SC4097R(CR)	Q(O)	2SC2714O(QO)
C(R)	2SC2411R(CR)	R	2SC2618
C(Q)	2SC2411KQ(CQ)	S	2SA1121
D	2SC2463	S(Q)	2SC3082KQ(SQ)
D(L)	2SB798L(DL)	U	2SC2404
E	2SA1022	W	2SD602
F	2SC2619	Y	2SD601
F(S)	2SA1037KS(FS)	Y(R)	2SD1819R(YR)
F(R)	2SA1576R(FR)	Z	2SD874
AA(S)	2SD1757KS(AAS)	DB(R)	2SD1766R(DBR)
BC(R)	2SB1188R(BCR)	IR(D)	2SA1484D(IRD)
BF(R)	2SB1308R(BFR)		
1D(T)	2SD1328T(1DT)	1C(R)	2SB902R(1CR)
B(3)	2SC1621(3)(B3)	L(6)	MMBC1623(6)(L6)
C(7)	2SA811(7)(C7)	L(6)	2SC1623(6)(L6)
L(7)	2SC2812(7)(L7)	F(2)	2SC1009(2)(F2)
M(6)	2SA812(6)(M6)	M(6)	2SA1179(6)(M6)
N(4)	2SC1653(4)(N4)		
D(16)	2SC1622A(16)(D16)	R(25)	2SC3356(25)(R25)
R(35)	2SC3583(35)(R35)	R(45)	2SC3585(45)(R45)
Y(25)	NTM3906(25)(Y25)		
1(D)	2SC3127D(1D)		
S1	FMS1	S2	FMS2
T1	IMT1	W1	FMW1
W2	FMW2	W3	FMW3
X1	IMX1	Y1	FMY1
Y3	FMY3	Z1	IMZ1
Z2	IMZ2		
4R	XN1C301	5H	XN4501
5K	XN4401		
Digital Transistor			
04	DTC114TK	06	DTC144TK
13	DTA143EK	15	DTA124K
15(s)	DTA124EU	16	DTA144EK
16(s)	DTA144EU	23	DTC143EK
24	DTC114EK	24(s)	DTC114EU
25	DTC124K	25(s)	DTC124EU
26	DTC144K	26(s)	DTC144EU
33	DTA143XK	43	DTC143XK
52	DTA123YK	64	DTC114YK
6B	UN5112	8B	UN5212
F52	DTB123	G21	DTD113ZK
H03	DTC343TK	H27	DTC363EK
R31	FPL2Q		
A1	FMA1	A2	FMA2
B2	IMB2	C2	FMC2
D2	IMD2	G1	FMG1
G2	FMG2	G5	FMG5
H2	IMH2		

Letter	Transistor Number	Letter	Transistor Number
FET			
G	2SK302	J	2SK208
K	2SK160	W	2SK322
X	2SK157	X(4)	2SK94(4)(X4)
X(17)	2SK425(17)(X17)	Z	2SK217
Y	2SK197		
XA	2SK980		
3	2SK620	3(O)	2SK621(O)(3O)
1M	2SA1052	1F	2SK321
1K	2SK316	2B	2SK374

* "(s)" in the above table shows a component with smaller size.

* Codes on the digital transistors show only the transistor numbers.

- (1) Identification for two letters.
Use this code and the following chart for component identification.

Example:

Code	Number
CD	2SA1122D
LD	2SC2462D

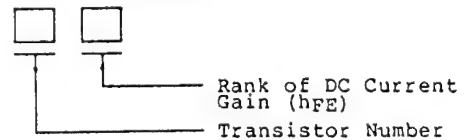


Fig.5-1 Leadless Transistor Code

- (2) Identification for two types of one letter and one numeral.
Use this code and the following chart for component identification.

Letter	Transistor Number
L	2SC1623

Example:

Code	Number
L5	2SC1623(5)
L6	2SC1623(6)

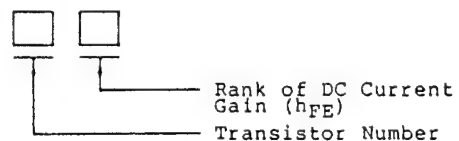
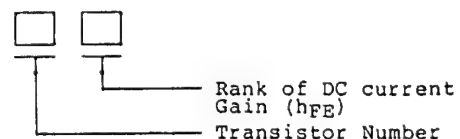


Fig.5-2 Leadless Transistor Code

Example:

Code	Number
1D	2SC3127D



Note: Codes S1, S2, T1, W1, W2, W3, X1, Y1, Y3, Z1 and Z2 show only the transistor numbers.

Fig.5-3 Leadless Transistor Code

- (3) Identification for one numeral and two letters.
Use this code and the following chart for component identification.

Example:

Code Number
1FQ 2SK321Q

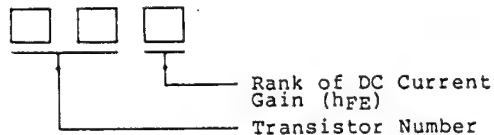


Fig. 5-4 Leadless Transistor Code

- (4) Identification for one letter and two numerals.
Use this code and the following chart for component identification.

Example:

Code Number
R25 25C3356

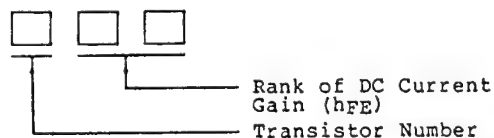


Fig. 5-5 Leadless Transistor Code

- (5) Identification for two letters and one numeral.
Use this code and the following chart for component identification.

Example:

Code Number
DV5 2SD596

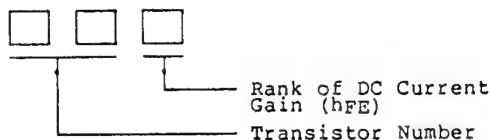


Fig. 5-6 Leadless Transistor Code

- (6) Identification for three letters.
Use this code and the following chart for component identification.

Example:

Code Number
AAS 2SD1757KS

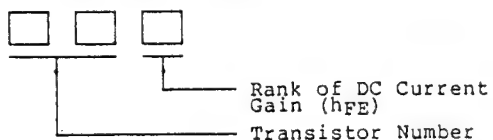


Fig. 5-7 Leadless Transistor Code

2. Leadless Diodes

Leadless diode numbers are indicated by a code on the surface, using one letter and one numeral, two letters, two letters and one numeral, two numerals, two numerals and one letter, or three numerals.
Use this code and the following chart for component identification.

Code	Diode Number	Code	Diode Number
BE	1SV172	MC(s)	MA143
MC	MA153	MH(s)	MA141K
MH	MA151K	MN(s)	MA141WA
MN	MA151WA	MT(s)	MA141WK
MO	MA152WA		
MT	MA151WK		
MU	MA152WK		
M1D	MA160	M1P	MA714
M2A	MA122	S1A	1SR143
N	DAN202K	Z	DA106K
A3	1S2835	A5	1S2837
C1	HSM88S	C2	HSM276S
1A	MA110		
3.0L	MA3030L	4.3L	MA3043L
4.7M	MA3047M	5.1M	MA3051M
5.1L	MA3051L	5.6M	MA3056M
6.2L	MA3062L	6.8M	MA3068
6.8M	MA3068M	7.5H	MA3075H
7.5L	MA3075L	8.2M	MA3082M
9.1M	MA3091	9.1M	MA3091M
10L	MA3100L	56M	MA3056M
75L	MA3075L	82M	MA3082M
91M	MA3091M		
20	HZM6-B	27	RD2.7M-B
30	RD3.0M-B	51	RD5.1M-B2
56	RD5.6M-B	91	RD9.1M-B
102	RD10M-B2	122	RD12M-B2
163	RD16M-B3	182	RD18M-B2
271	RD2.7M-B	272	RD2.7M-B2
301	RD3.0M-B	362	RD3.6M-B2
391	RD3.9M-B1	512	RD5.1M-B2
561	RD5.6M-B	621	RD6.2M-B1
681	RD6.8M-B	683	RD6.8M-B3
911	RD9.1M-B		

* "(s)" in the above table shows a component with smaller size.

3. Leadless Resistors

The resistor value is indicated on the surface of the component, using a three-digit numbers, or one letter and one numeral.

- (1) Identification for three digit numbers.
Read this code following the same procedure as when reading the color code on discrete resistors.

Example:

Code	Value
330	$33 \times 10^0 = 33 \text{ ohms}$
561	$56 \times 10^1 = 560 \text{ ohms}$
123	$12 \times 10^3 = 12K \text{ ohms}$
1R2	$1 + 0.2 = 1.2 \text{ ohms}$

(R: Decimal point)

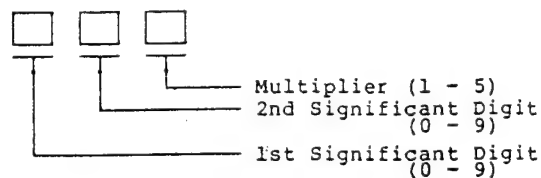


Fig. 5-8 Leadless Resistor Code

- (2) Identification for one letter and one numeral.
Use this code and the following chart for component identification.

Letter	Value	Letter	Value	Letter	Value
A	1	J	2.2	S	4.7
C	1.2	L	2.7	U	5.6
E	1.5	N	3.3	W	6.8
G	1.8	Q	3.9	Y	8.2

Example:
Code

Code	Value
A1	$1 \times 10^1 = 10 \text{ ohms}$
G2	$1.8 \times 10^2 = 180 \text{ ohms}$
L3	$2.7 \times 10^3 = 2700 \text{ ohms}$
S4	$4.7 \times 10^4 = 47K \text{ ohms}$
W5	$6.8 \times 10^5 = 680K \text{ ohms}$



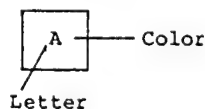
Multiplier (0 - 5)
Numerical Value

Fig. 5-9 Leadless Resistor Code

4. Leadless Capacitors

The capacitance value is indicated on the surface of the component, using body color and one letter, or one letter and one numeral.

- (1) Identification for body color and one letter.

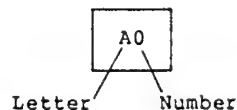


Body Color	Letter	Value	Body Color	Letter	Value
Red	A	1 (PF)	Blue	A	100 (PF)
	C	2		C	120
	E	3		E	150
	G	4		G	180
	J	5		J	220
	L	6		L	270
	N	7		N	330
	Q	8		Q	390
	S	9		S	470
Black	A	10 (PF)	White	U	560
	C	12		W	680
	E	15		Y	820
	G	18	Green	A	0.001 (μF)
	J	22		E	0.0015
	L	27		J	0.0022
	N	33		L	0.0027
	Q	39		N	0.0033
	S	47		S	0.0047
	U	56		U	0.0068
	W	68	Yellow	A	0.01 (μF)
	Y	82		E	0.015
				J	0.022
				N	0.033
				S	0.047
				U	0.056
				W	0.068
				Y	0.082

Example:

Color	Code	Value
Red	A	1PF
Black	A	10PF

- (2) Identification for one letter and one numeral.



Letter /Number	Value	Letter /Number	Value
A0	1 (PF)	A2	100 (PF)
H0	2	C2	120
M0	3	E2	150
d0	4	G2	180
f0	5	J2	220
m0	6	L2	270
n0	7	N2	330
t0	8	Q2	390
y0	9	S2	470
		U2	560
A1	10 (PF)	W2	680
C1	12	Y2	820
E1	15		
G1	18	A3	0.001 (μF)
J1	22	E3	0.0015
L1	27	J3	0.0022
N1	33	N3	0.0033
Q1	39	S3	0.0047
S1	47	W3	0.0068
U1	56		
W1	68	A4	0.01 (μF)
Y1	82	E4	0.015
		J4	0.022
		N4	0.033
		S4	0.047
		U4	0.056
		W4	0.068
		A5	0.1

Example:

Letter /Number	Value
A0	1PF
A1	10PF

5. Leadless Jumper

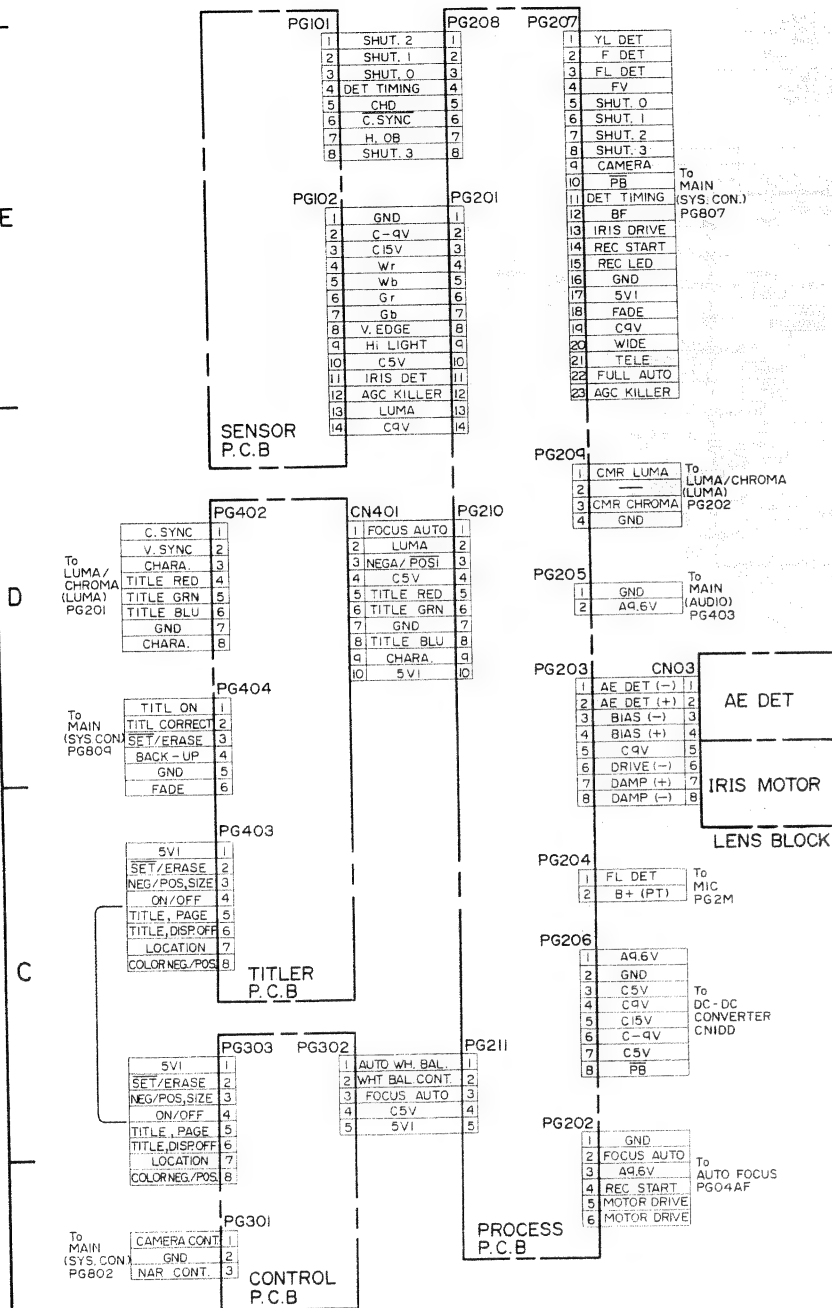
The leadless jumper is indicated as shown below.

- (1) (2) (3) (4)



CIRCUIT BOARD CONNECTION DIAGRAM

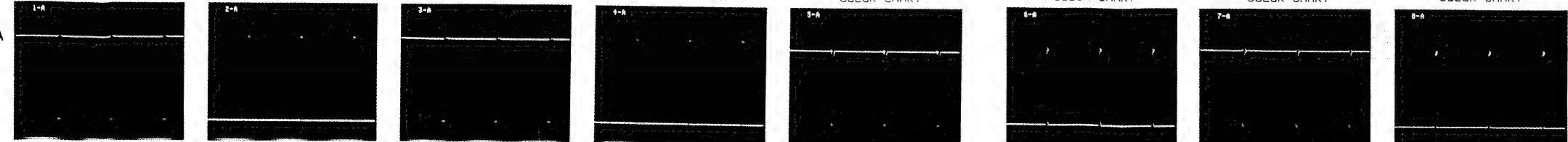
- CAMERA



A



1-A	IC102-3	5.2Up-p	2-A	IC102-4	5.2Up-p	3-A	IC102-5	5.2Up-p	4-A	IC102-6	5.2Up-p	5-A	IC102-7	5.2Up-p	6-A	IC102-8	5.2Up-p	7-A	IC102-9	5.2Up-p	8-A	IC102-10	5.2Up-p	9-A	IC102-11	5.2Up-p	10-A	IC102-12	5.2Up-p	11-A	IC102-13	5.2Up-p	12-A	IC102-14	5.2Up-p	13-A	IC102-15	5.2Up-p	14-A	IC102-16	5.2Up-p	15-A	IC102-17	5.2Up-p	16-A	IC102-18	5.2Up-p	17-A	IC102-19	5.2Up-p	18-A	IC102-20	5.2Up-p	19-A	IC102-21	5.2Up-p	20-A	IC102-22	5.2Up-p	21-A	IC102-23	5.2Up-p	22-A	IC102-24	5.2Up-p	23-A	IC102-25	5.2Up-p	24-A	IC102-26	5.2Up-p	25-A	IC102-27	5.2Up-p	26-A	IC102-28	5.2Up-p	27-A	IC102-29	5.2Up-p	28-A	IC102-30	5.2Up-p	29-A	IC102-31	5.2Up-p	30-A	IC102-32	5.2Up-p	31-A	IC102-33	5.2Up-p	32-A	IC102-34	5.2Up-p	33-A	IC102-35	5.2Up-p	34-A	IC102-36	5.2Up-p	35-A	IC102-37	5.2Up-p	36-A	IC102-38	5.2Up-p	37-A	IC102-39	5.2Up-p	38-A	IC102-40	5.2Up-p	39-A	IC102-41	5.2Up-p	40-A	IC102-42	5.2Up-p	41-A	IC102-43	5.2Up-p	42-A	IC102-44	5.2Up-p	43-A	IC102-45	5.2Up-p	44-A	IC102-46	5.2Up-p	45-A	IC102-47	5.2Up-p	46-A	IC102-48	5.2Up-p	47-A	IC102-49	5.2Up-p	48-A	IC102-50	5.2Up-p	49-A	IC102-51	5.2Up-p	50-A	IC102-52	5.2Up-p	51-A	IC102-53	5.2Up-p	52-A	IC102-54	5.2Up-p	53-A	IC102-55	5.2Up-p	54-A	IC102-56	5.2Up-p	55-A	IC102-57	5.2Up-p	56-A	IC102-58	5.2Up-p	57-A	IC102-59	5.2Up-p	58-A	IC102-60	5.2Up-p	59-A	IC102-61	5.2Up-p	60-A	IC102-62	5.2Up-p	61-A	IC102-63	5.2Up-p	62-A	IC102-64	5.2Up-p	63-A	IC102-65	5.2Up-p	64-A	IC102-66	5.2Up-p	65-A	IC102-67	5.2Up-p	66-A	IC102-68	5.2Up-p	67-A	IC102-69	5.2Up-p	68-A	IC102-70	5.2Up-p	69-A	IC102-71	5.2Up-p	70-A	IC102-72	5.2Up-p	71-A	IC102-73	5.2Up-p	72-A	IC102-74	5.2Up-p	73-A	IC102-75	5.2Up-p	74-A	IC102-76	5.2Up-p	75-A	IC102-77	5.2Up-p	76-A	IC102-78	5.2Up-p	77-A	IC102-79	5.2Up-p	78-A	IC102-80	5.2Up-p	79-A	IC102-81	5.2Up-p	80-A	IC102-82	5.2Up-p	81-A	IC102-83	5.2Up-p	82-A	IC102-84	5.2Up-p	83-A	IC102-85	5.2Up-p	84-A	IC102-86	5.2Up-p	85-A	IC102-87	5.2Up-p	86-A	IC102-88	5.2Up-p	87-A	IC102-89	5.2Up-p	88-A	IC102-90	5.2Up-p	89-A	IC102-91	5.2Up-p	90-A	IC102-92	5.2Up-p	91-A	IC102-93	5.2Up-p	92-A	IC102-94	5.2Up-p	93-A	IC102-95	5.2Up-p	94-A	IC102-96	5.2Up-p	95-A	IC102-97	5.2Up-p	96-A	IC102-98	5.2Up-p	97-A	IC102-99	5.2Up-p	98-A	IC102-100	5.2Up-p	99-A	IC102-101	5.2Up-p	100-A	IC102-102	5.2Up-p	101-A	IC102-103	5.2Up-p	102-A	IC102-104	5.2Up-p	103-A	IC102-105	5.2Up-p	104-A	IC102-106	5.2Up-p	105-A	IC102-107	5.2Up-p	106-A	IC102-108	5.2Up-p	107-A	IC102-109	5.2Up-p	108-A	IC102-110	5.2Up-p	109-A	IC102-111	5.2Up-p	110-A	IC102-112	5.2Up-p	111-A	IC102-113	5.2Up-p	112-A	IC102-114	5.2Up-p	113-A	IC102-115	5.2Up-p	114-A	IC102-116	5.2Up-p	115-A	IC102-117	5.2Up-p	116-A	IC102-118	5.2Up-p	117-A	IC102-119	5.2Up-p	118-A	IC102-120	5.2Up-p	119-A	IC102-121	5.2Up-p	120-A	IC102-122	5.2Up-p	121-A	IC102-123	5.2Up-p	122-A	IC102-124	5.2Up-p	123-A	IC102-125	5.2
-----	---------	---------	-----	---------	---------	-----	---------	---------	-----	---------	---------	-----	---------	---------	-----	---------	---------	-----	---------	---------	-----	----------	---------	-----	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	----------	---------	------	-----------	---------	------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	---------	-------	-----------	-----



9

5-8 SENSOR

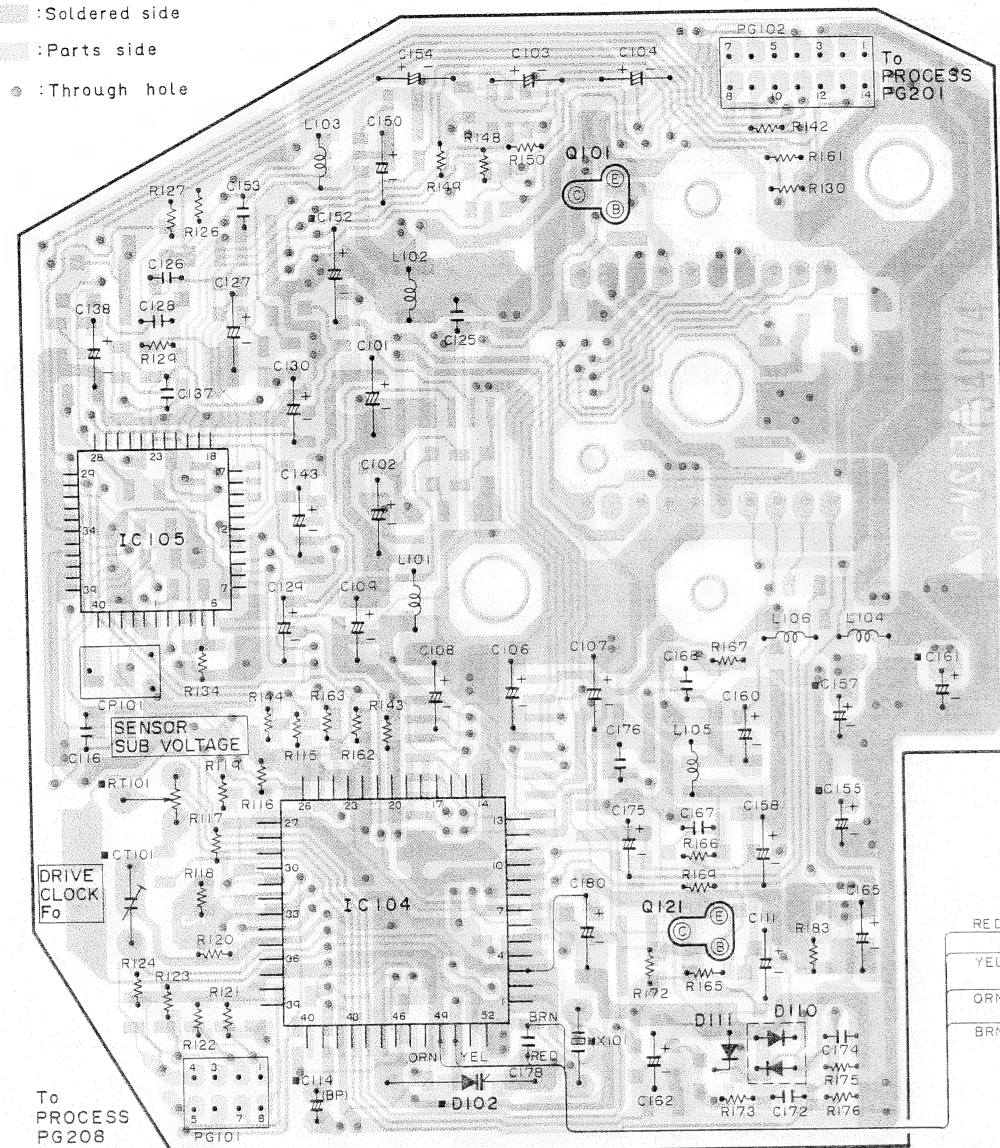
SCHEMATIC	PAGE	SCHEMATIC	PAGE
AUTO FOCUS-LED	5-22	MOTOR DRIVE	5-4
AUDIO	-31	MIC	5-4
CAPUSTAN MOTOR	-45	PROCESS	-17
CONTROL	-19	PRE AMP	-17
CHROMA	-37	REGULATOR	-17
DC-DC CONVERTER	-46	SENSOR	-17
ENCODER	-15	SERVO	-17
ELECTRONIC VIEWFINDER(EVF)	-20	SYSTEM CONTROL	-17
FM AUDIO	-47	SWITCHING REGULATOR	-17
FOCUS SENSOR	-21	TITLER	5-4
FUNCTION SW	-27	TROUBLE DET	5-4
LUMINANCE	5-35		

SENSOR CIRCUIT BOARD

- : Soldered side
- : Parts side
- : Through hole

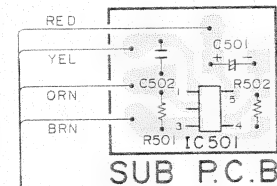
- : Soldered side
- : Parts side
- : Through hole

NOTE: MARK "■" IS DISCRETE COMPONENT.
MARK "Z" IS LEADLESS (CHIP) JUMPER.

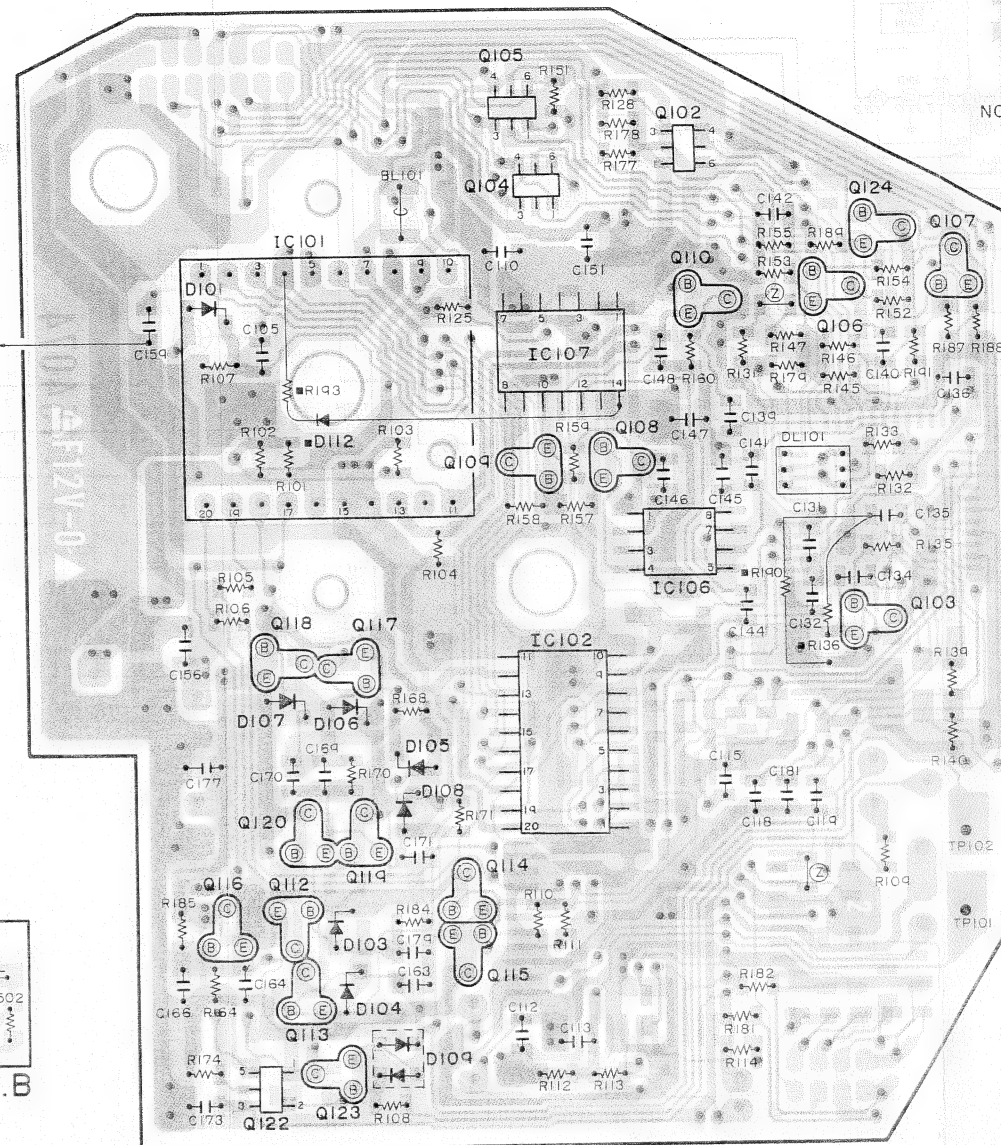


NOTE: MARK "■" IS DISCRETE COMPONENT.

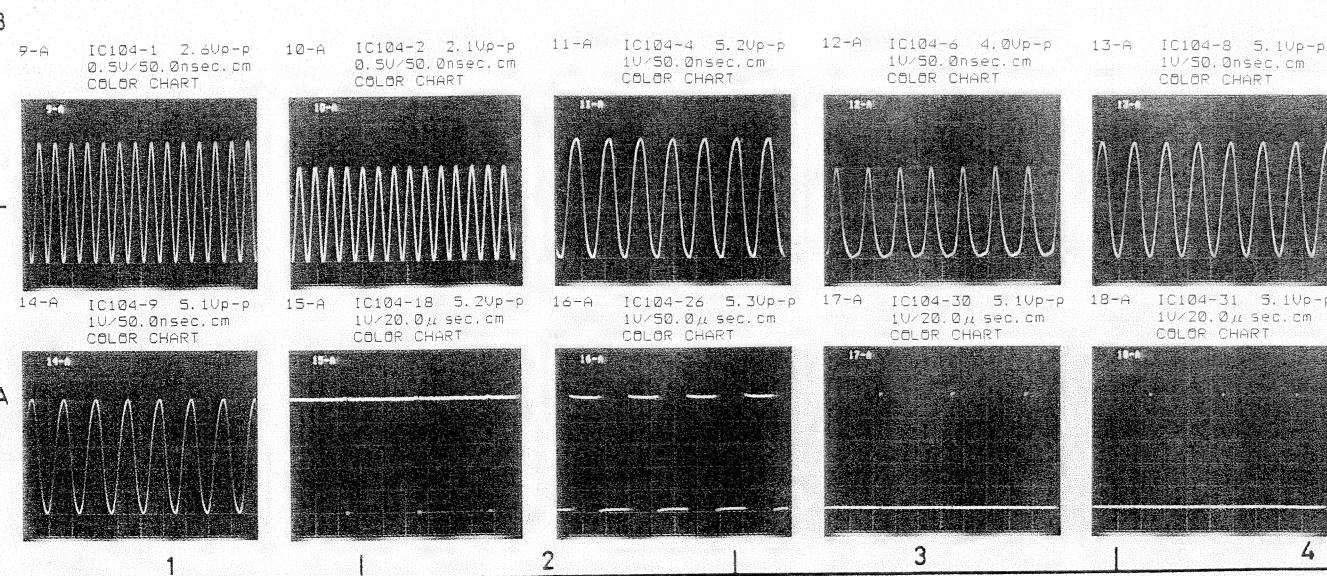
SENSOR P.C.B
(COMPONENT SIDE)



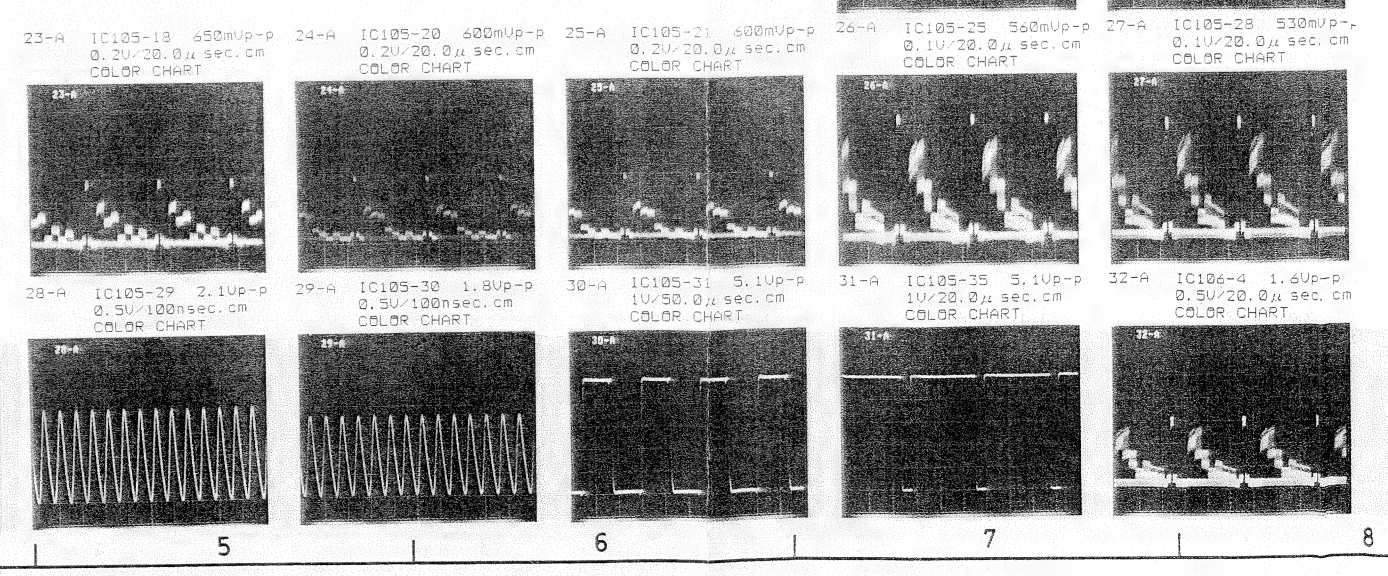
SUB P.C.B



SENSOR P.C.B
(SOLDER SIDE)



SENSOR 5-9



5-10 SENSOR

PROCESS (PROCESS SECTION) SCHEMATIC

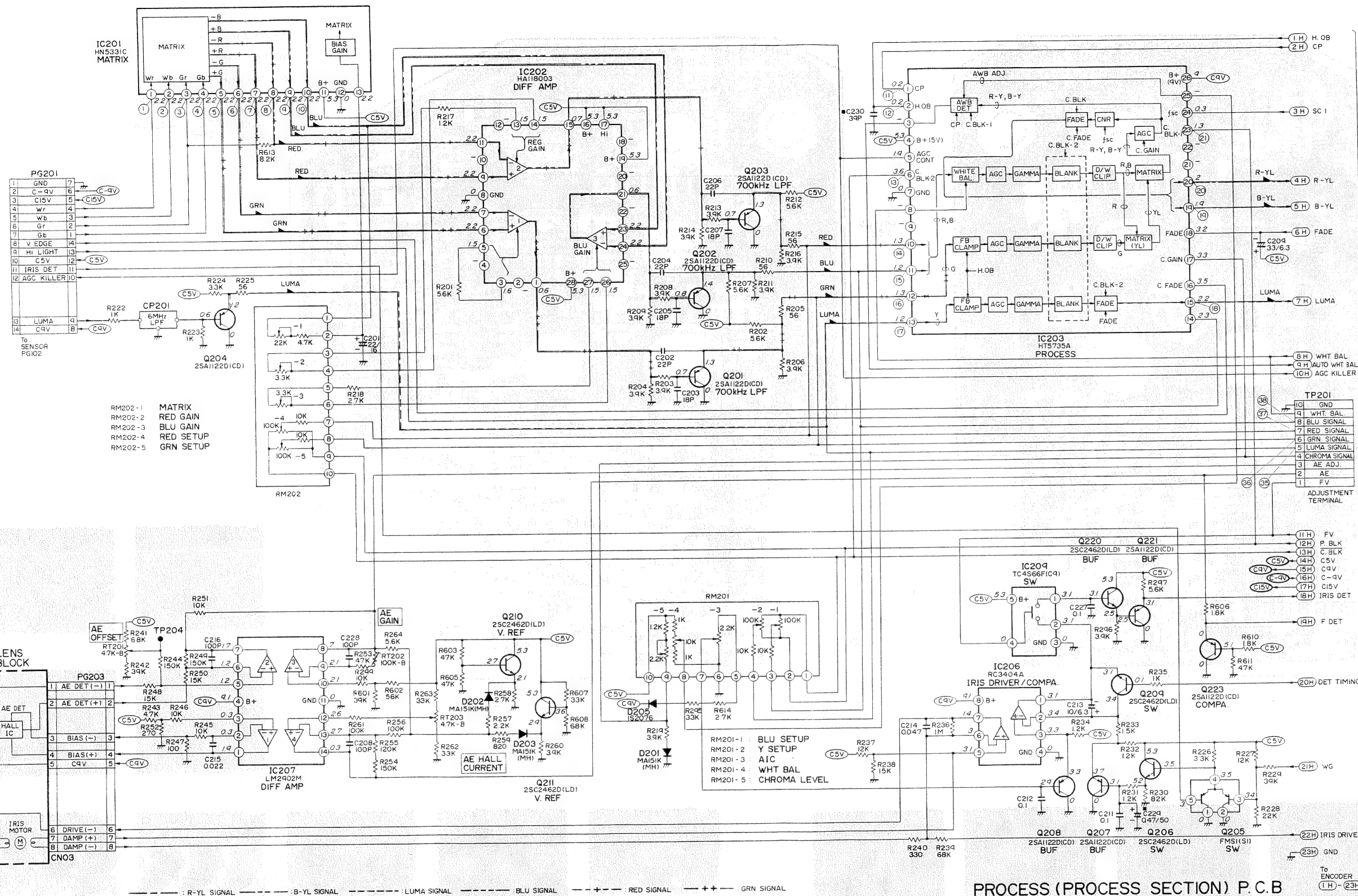
E

D

C

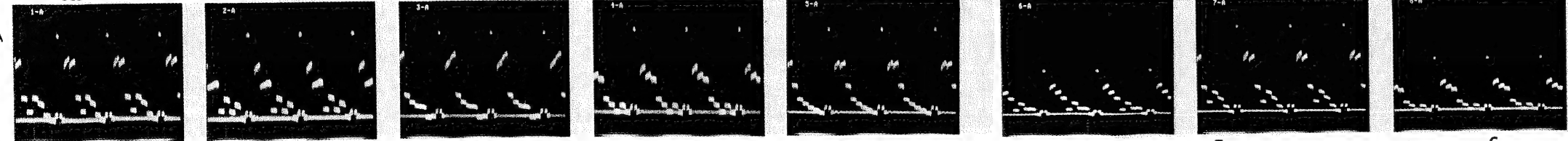
B

A



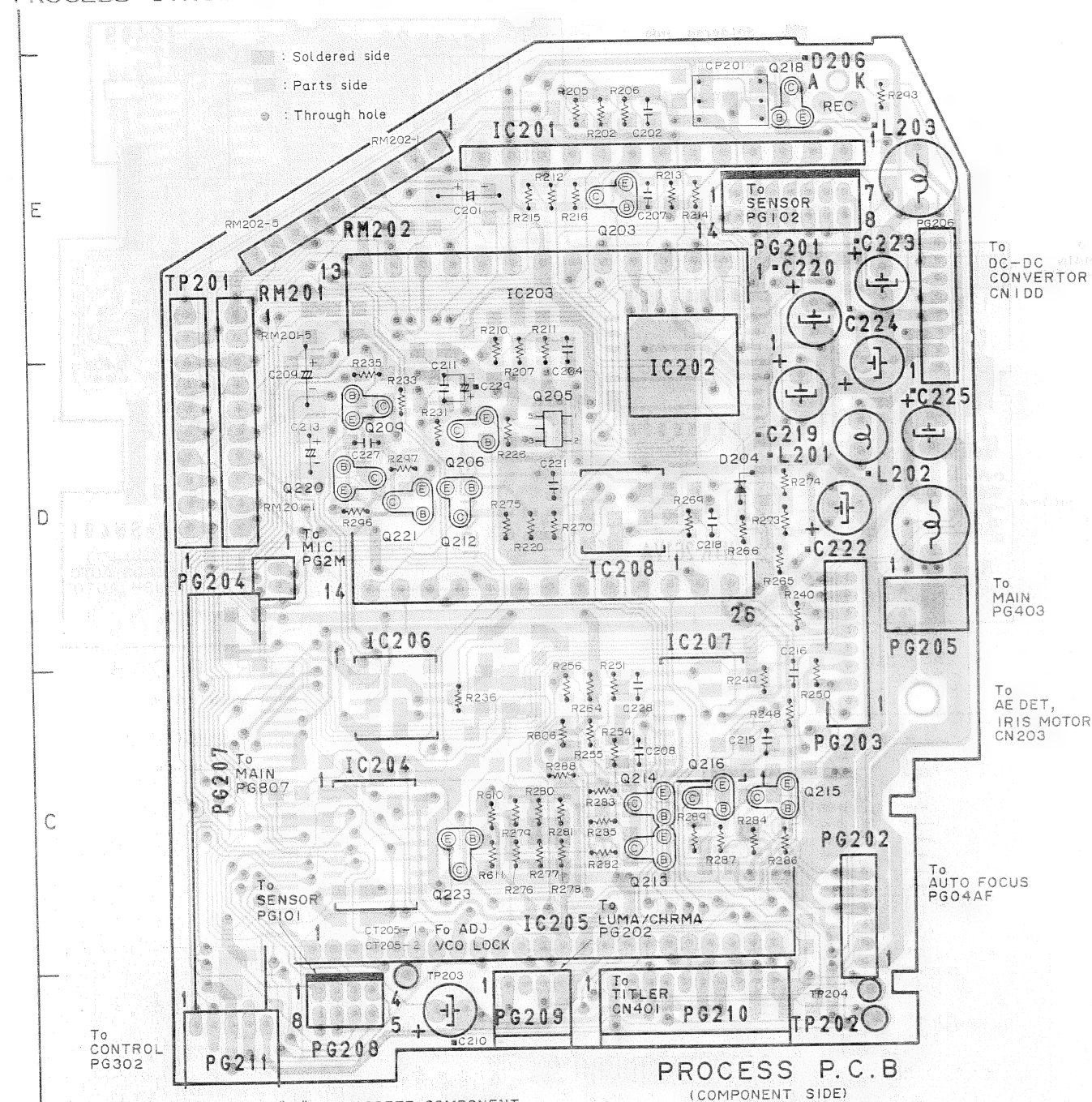
PROCESS (PROCESS SECTION) P.C.B

- 1-A IC201-1 540mUp-p 0.1V/20.0μ sec. cm COLOR CHART
- 2-A IC201-2 550mUp-p 0.1V/20.0μ sec. cm COLOR CHART
- 3-A IC201-3 540mUp-p 0.1V/20.0μ sec. cm COLOR CHART
- 4-A IC201-4 550mUp-p 0.1V/20.0μ sec. cm COLOR CHART
- 5-A IC201-5 540mUp-p 0.1V/20.0μ sec. cm COLOR CHART
- 6-A IC201-6 150mUp-p 50mU/20.0μ sec. cm COLOR CHART
- 7-A IC201-7 540mUp-p 0.1V/20.0μ sec. cm COLOR CHART
- 8-A IC201-8 340mUp-p 0.1V/20.0μ sec. cm COLOR CHART

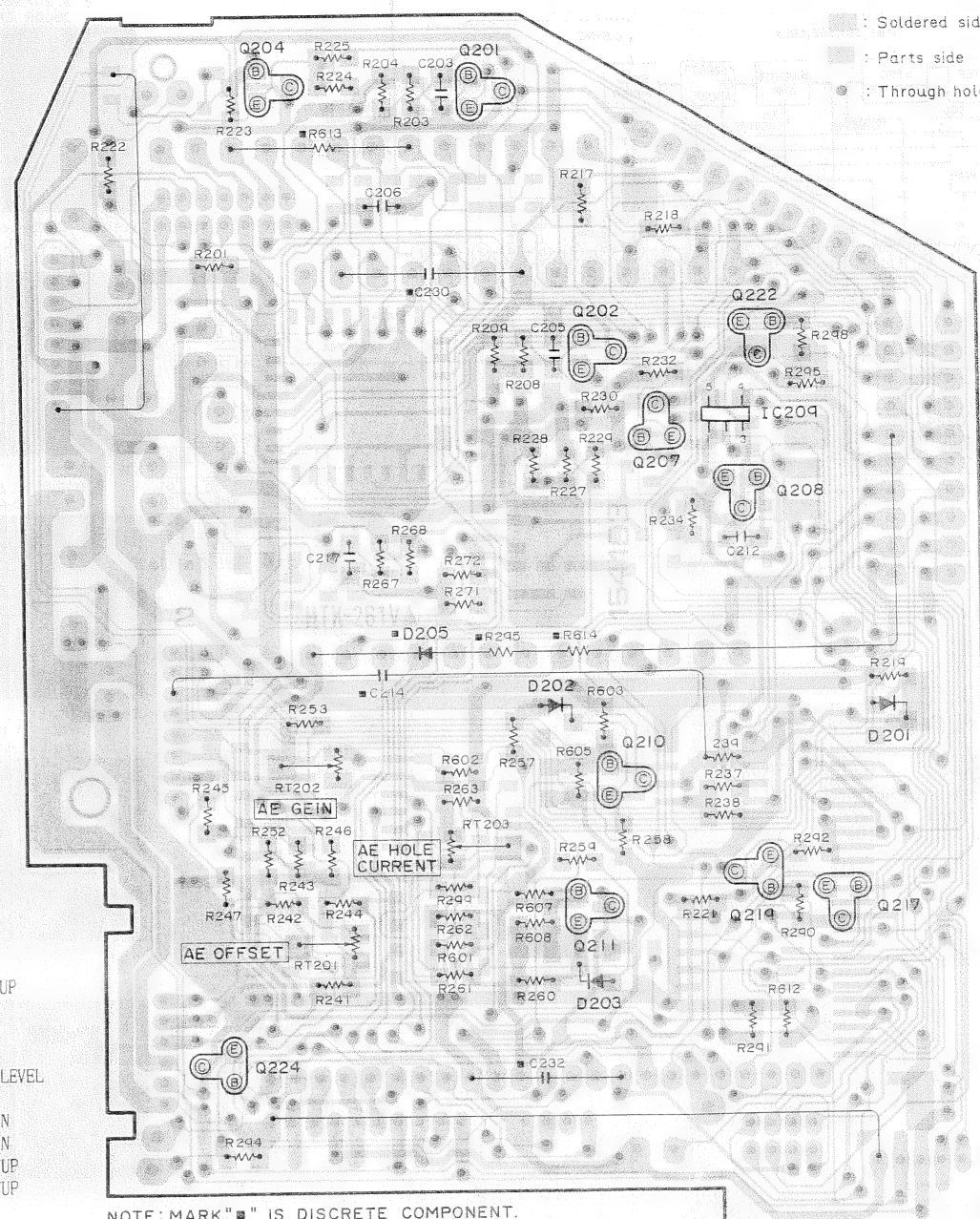


SCHEMATIC	PAGE	SCHEMATIC	PAGE
AUTO FOCUS-LED	5-22	MOTOR DRIVE	5-43
AUDIO	5-31	MIC	5-48
AUDIO MOTOR	5-45	PROCESS	5-11
CONTROL	5-19	PRE AMP	5-33
CHROMA	5-37	REGULATOR	5-27
DC-DC CONVERTER	5-46	SENSOR	5-7
ENCODER	5-15	SERVO	5-25
ELECTRONIC VIEWFINDER(EVF)	5-20	SYSTEM CONTROL	5-23
FM AUDIO	5-47	SWITCHING REGULATOR	5-46
FOCUS SENSOR	5-21	TITLER	5-17
FUNCTION SW	5-27	TROUBLE DET	5-45
LUMINANCE	5-35		

PROCESS CIRCUIT BOARD

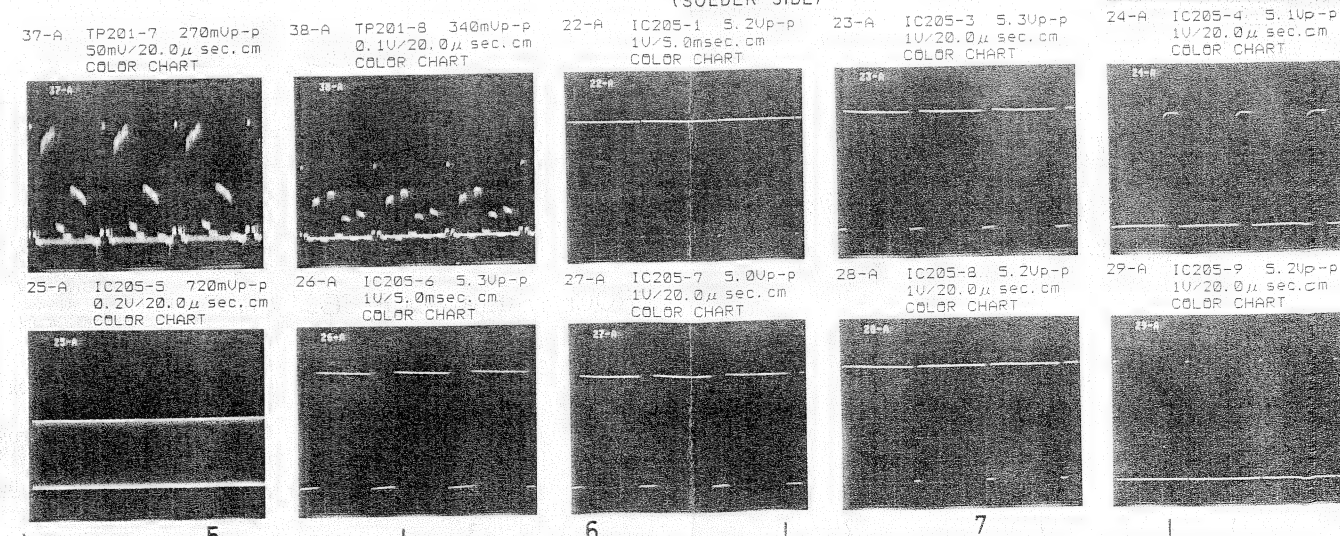


RM201-1: BLU SETUP
RM201-2: Y SETUP
RM201-3: AIC
RM201-4: WHT BAL
RM201-5: CHROMA LEVEL
RM202-1: MATRIX
RM202-2: RED GAIN
RM202-3: BLU GAIN
RM202-4: RED SETUP
RM202-5: GRN SETUP



NOTE: MARK "■" IS DISCRETE COMPONENT.

PROCESS P.C.B (SOLDER SIDE)



PROCESS(ENCODER SECTION) SCHEMATIC

TITLER CIRCUIT BOARD

GRADE 110010 25300H94

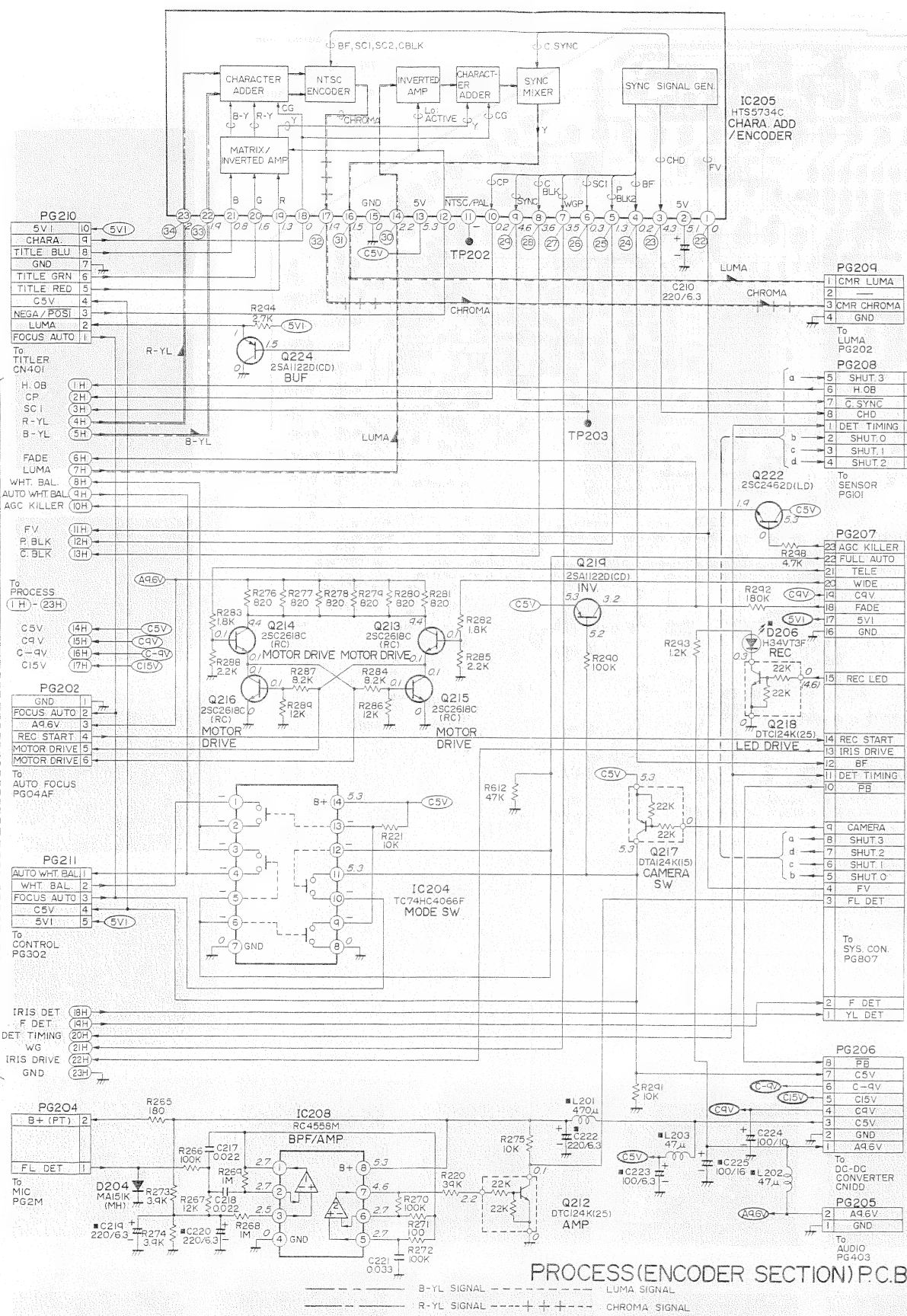
E

D

C

B

A



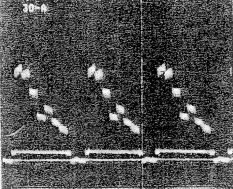
PROCESS(ENCODER SECTION) P.C.B

2

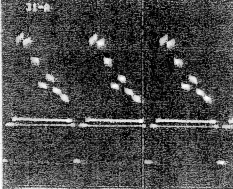
3

SCHEMATIC	PAGE
AUTO FOCUS-LED	5-22
AUDIO	5-31
CAPUSTAN MOTOR	5-45
CONTROL	5-19
CHROMA	5-37
DC-DC CONVERTER	5-46
ENCODER	5-15
ELECTRONIC VIEWFINDER(EVF)	5-20
FM AUDIO	5-47
FOCUS SENSOR	5-21
FUNCTION SW	5-27
LUMINANCE	5-35
MOTOR DRIVE	5-43
MIC	5-48
PROCESS	5-11
PRE AMP	5-33
REGULATOR	5-27
SENSOR	5-7
SERVO	5-25
SYSTEM CONTROL	5-23
SWITCHING REGULATOR	5-46
TITLER	5-17
TROUBLE DET	5-45

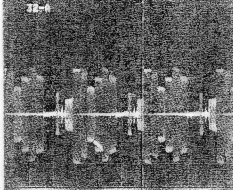
30-A IC205-14 880mUp-p
0.2V/20.0μ sec. cm
COLOR CHART



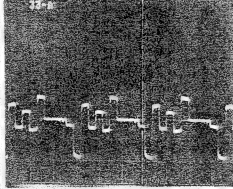
31-A IC205-16 1.1Up-p
0.2V/20.0μ sec. cm
COLOR CHART



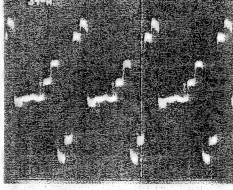
32-A IC205-17 850mUp-p
0.2V/20.0μ sec. cm
COLOR CHART



33-A IC205-22 1.4Up-p
0.5V/20.0μ sec. cm
COLOR CHART



34-A IC205-23 650mUp-p
0.1V/20.0μ sec. cm
COLOR CHART



SCHEMATIC	PAGE
AUTO FOCUS-LED	5-22
AUDIO	5-31
CAPUSTAN MOTOR	5-45
CONTROL	5-19
CHROMA	5-37
DC-DC CONVERTER	5-46
ENCODER	5-15
ELECTRONIC VIEWFINDER(EVF)	5-20
FM AUDIO	5-47
FOCUS SENSOR	5-21
FUNCTION SW	5-27
LUMINANCE	5-35
MOTOR DRIVE	5-43
MIC	5-48
PROCESS	5-11
PRE AMP	5-33
REGULATOR	5-27
SENSOR	5-7
SERVO	5-25
SYSTEM CONTROL	5-23
SWITCHING REGULATOR	5-46
TITLER	5-17
TROUBLE DET	5-45

ENCODER 5-15

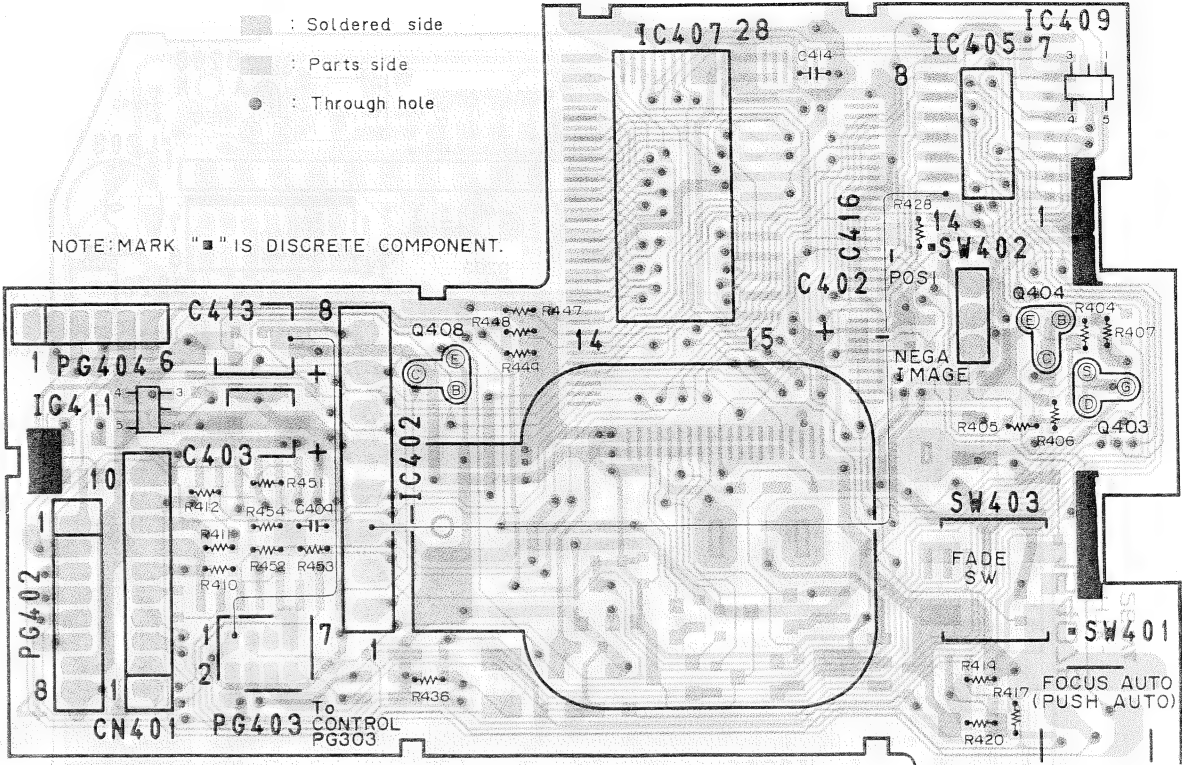
5-16 TITLER

To
MAIN
PG809

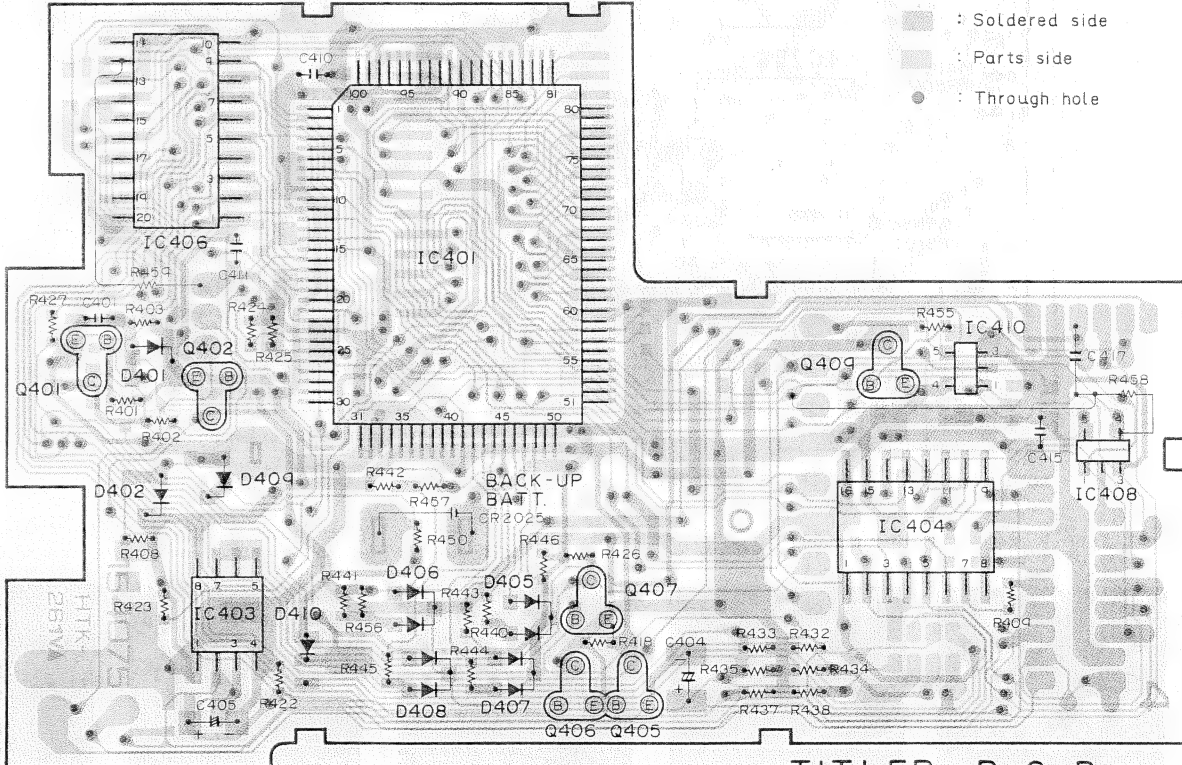
To
LUMA/CHROMA
PG201

■ : Soldered side
□ : Parts side
● : Through hole

NOTE: MARK "■" IS DISCRETE COMPONENT.



To
PROCESS
PG210



TITLER P.C.B
(COMPONENT SIDE)

■ : Soldered side
□ : Parts side
● : Through hole

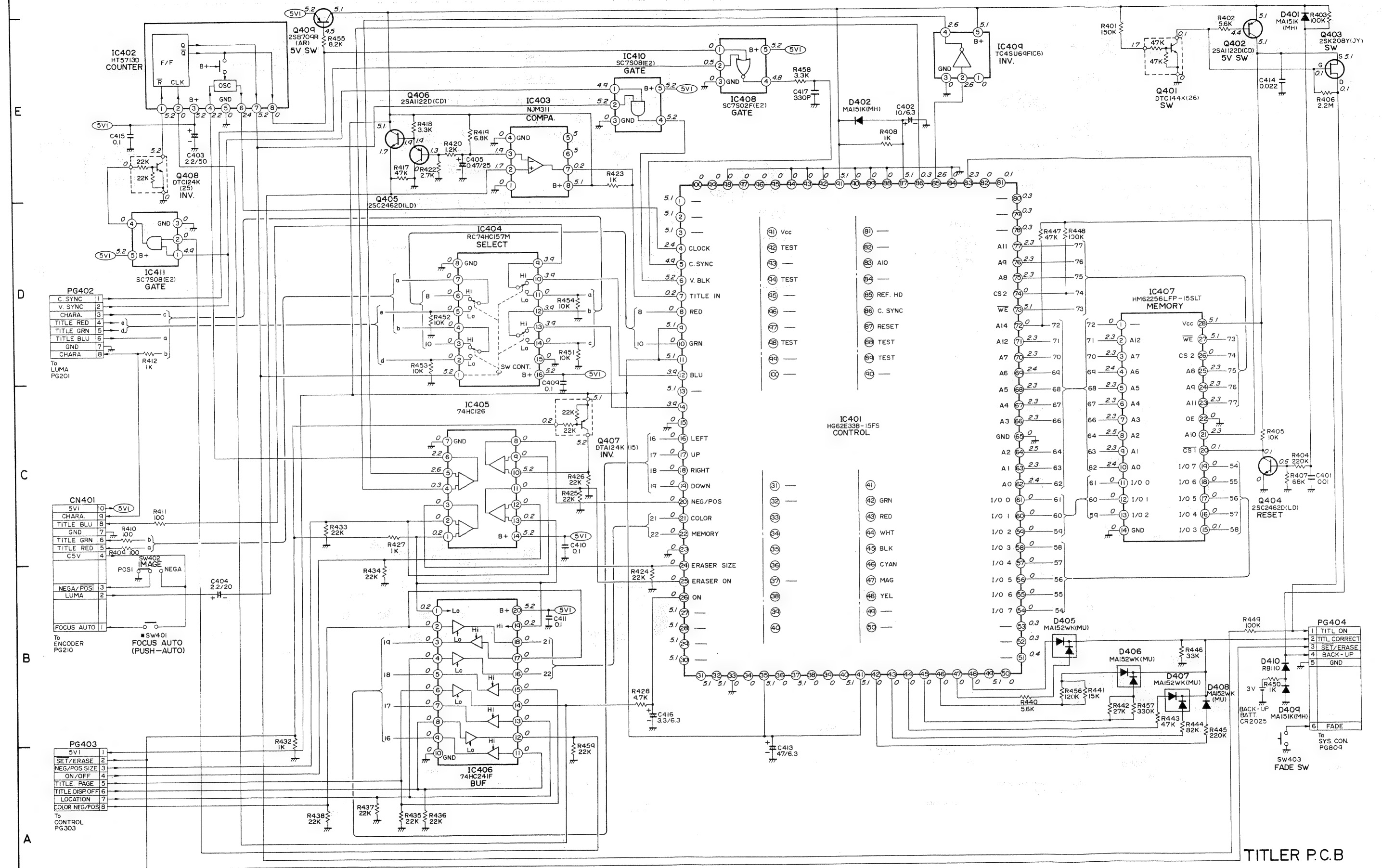
TITLER P.C.B
(SOLDER SIDE)

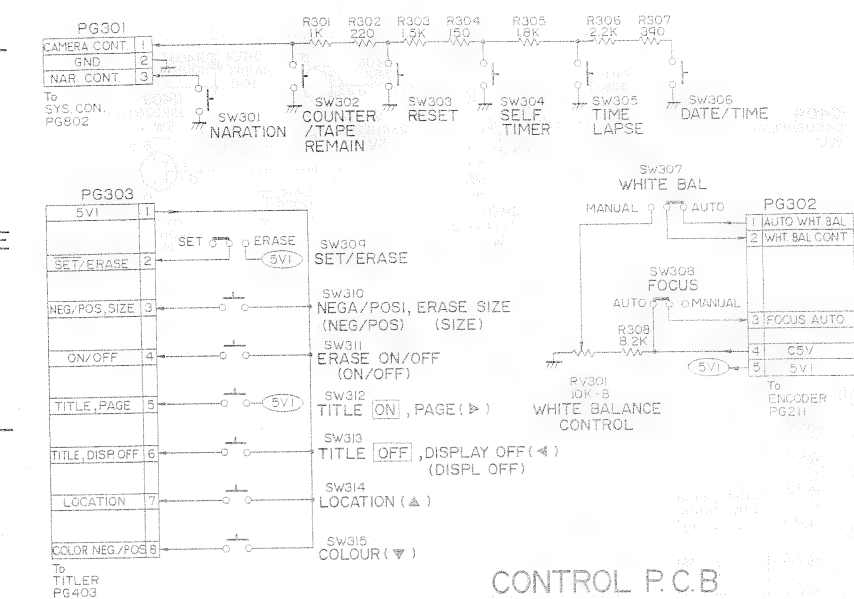
6

7

8

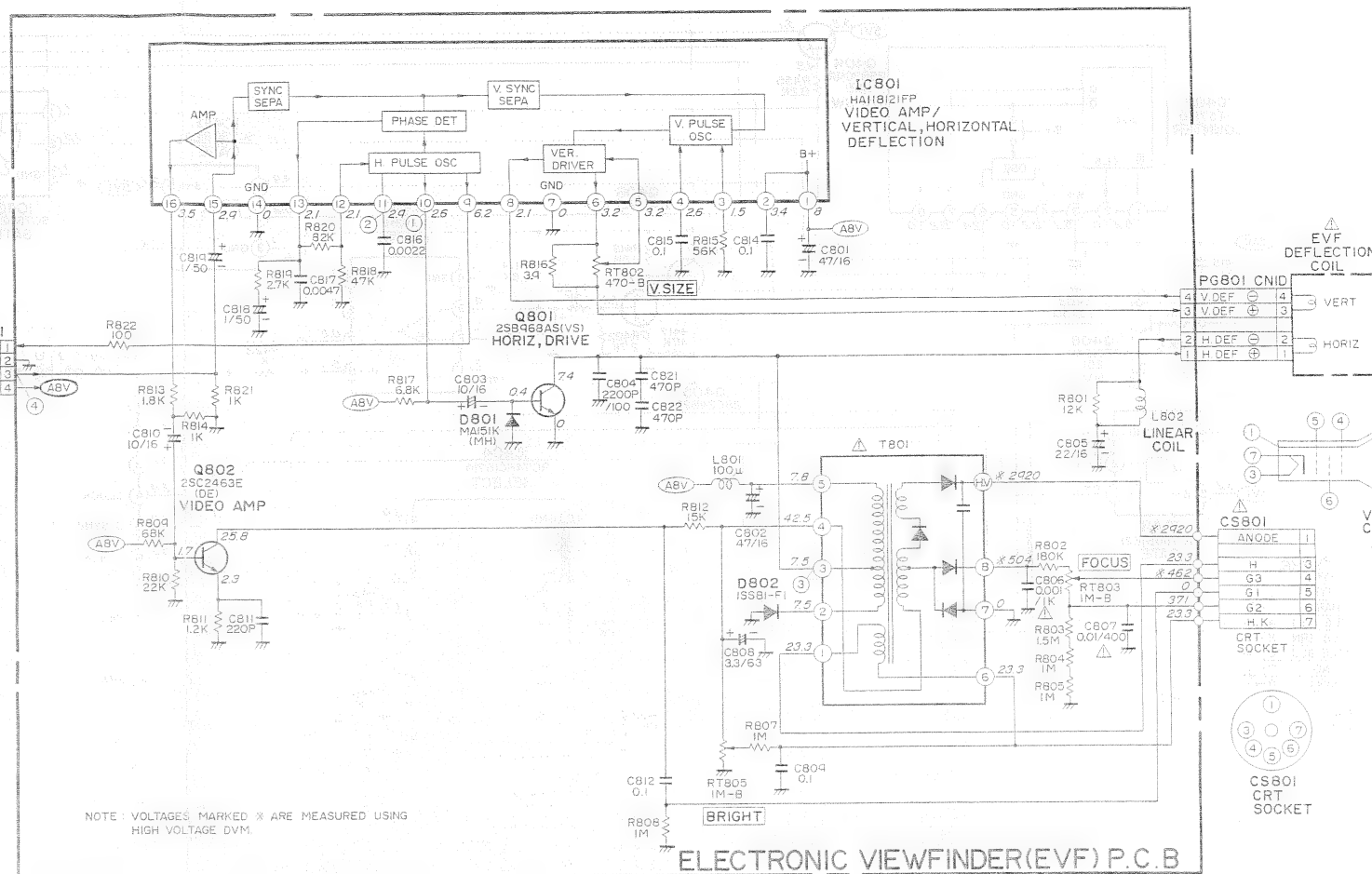
TITLER SCHEMATIC





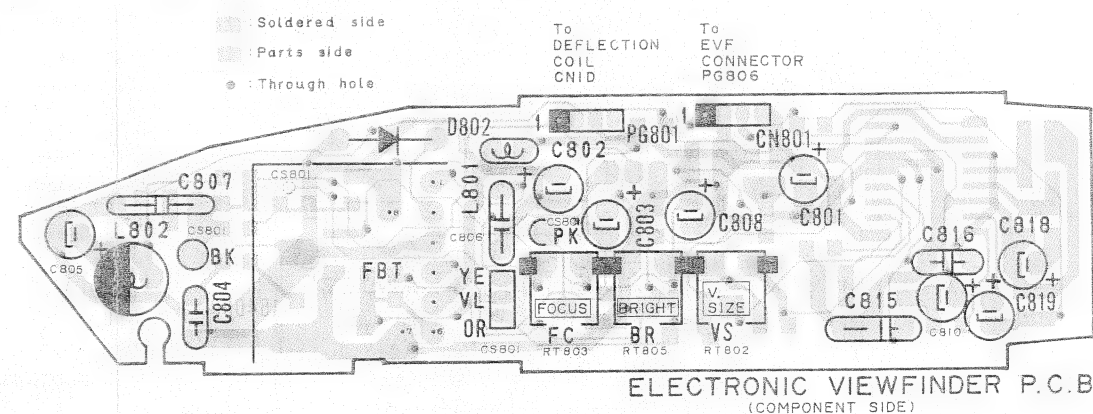
CONTROL P.C.B

SCHEMATIC	PAGE
AUTO FOCUS-LED	5-22
AUDIO	5-31
CAPUSTAN MOTOR	5-45
CONTROL	5-19
CHROMA	5-37
DC-DC CONVERTER	5-46
ENCODER	5-15
ELECTRONIC VIEWFINDER(EVF)	5-20
FM AUDIO	5-47
FOCUS SENSOR	5-21
FUNCTION SW	5-27
LUMINANCE	5-35
MOTOR DRIVE	5-43
MIC	5-48
PROCESS	5-11
PRE AMP	5-33
REGULATOR	5-27
SENSOR	5-7
SERVO	5-25
SYSTEM CONTROL	5-23
SWITCHING REGULATOR	5-46
TITLER	5-17
TROUBLE DET	5-45

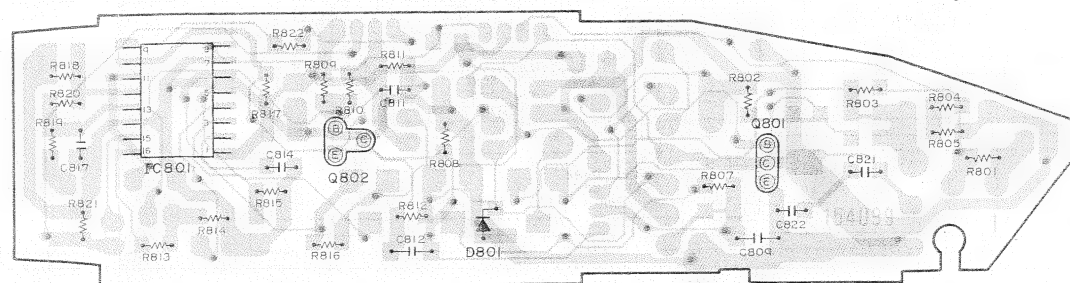


ELECTRONIC VIEWFINDER(EVF) P.C.B

ELECTRONIC VIEWFINDER(EVF) CIRCUIT BOARD

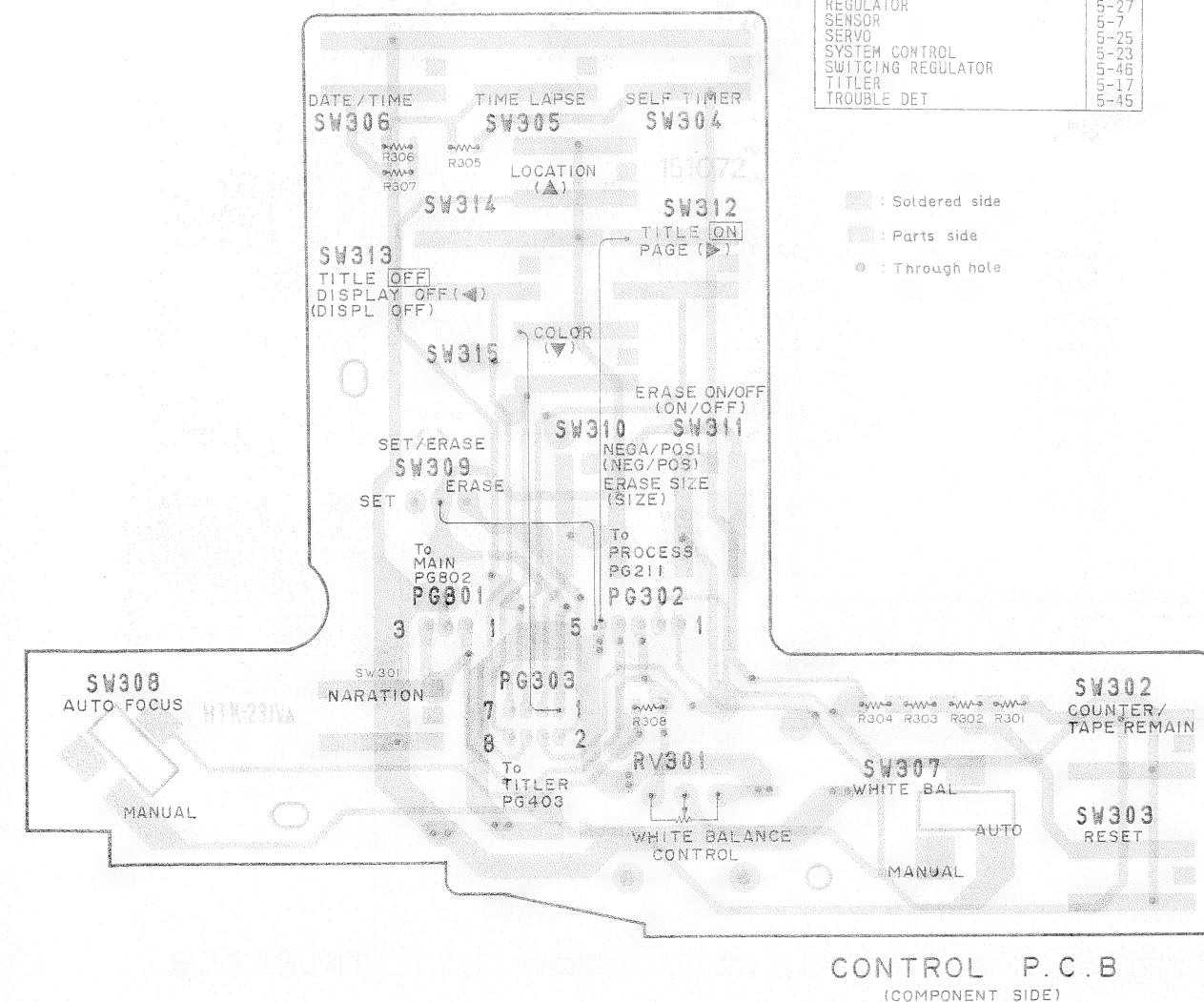


ELECTRONIC VIEWFINDER P.C.B (COMPONENT SIDE)



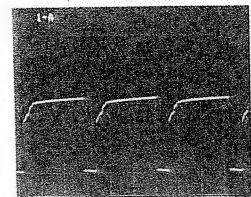
ELECTRONIC VIEWFINDER P.C.B (SOLDER SIDE)

CONTROL CIRCUIT BOARD

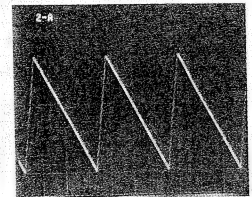


CONTROL P.C.B (COMPONENT SIDE)

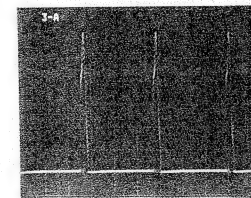
1-A IC801-10 1.7Vp-p 0.5V/20.0μ sec. cm
COLOR CHART



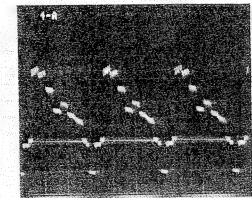
2-A IC801-11 1.0Vp-p 0.2V/20.0μ sec. cm
COLOR CHART



3-A T801-3 120Vp-p 20V/20.0μ sec. cm
COLOR CHART

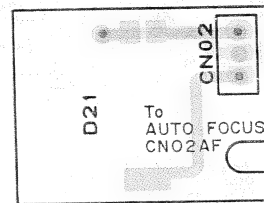


4-A CN801-3 930mVp-p 0.2V/20.0μ sec. cm
COLOR CHART



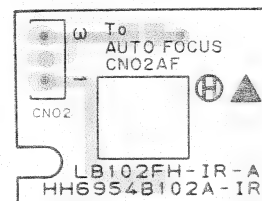
SCHEMATIC	PAGE
AUTO FOCUS-LED	5-22
AUDIO	5-31
CAPUSTAN MOTOR	5-45
CONTROL	5-19
CHROMA	5-37
DC-DC CONVERTER	5-46
ENCODER	5-15
ELECTRONIC VIEWFINDER(EVF)	5-20
FM AUDIO	5-27
FOCUS SENSOR	5-21
FUNCTION SW	5-43
LUMINANCE	5-35
MOTOR DRIVE	5-43
MIC	5-48
PROCESS	5-11
PRE AMP	5-33
REGULATOR	5-23
SENSOR	5-7
SERVO	5-25
SYSTEM CONTROL	5-46
SWITCHING REGULATOR	5-17
TITLER	5-45
TROUBLE DET	5-45

LED CIRCUIT BOARD



LED P.C.B (COMPONENT SIDE)

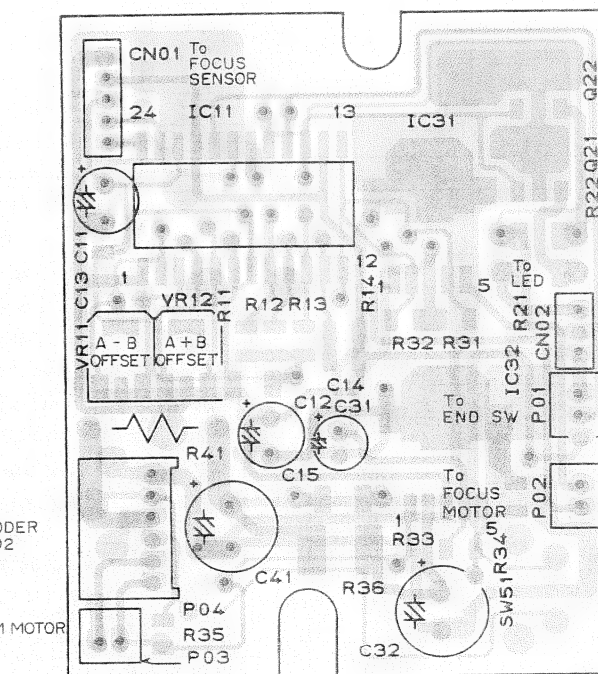
■ : Soldered side
□ : Parts side
● : Through hole



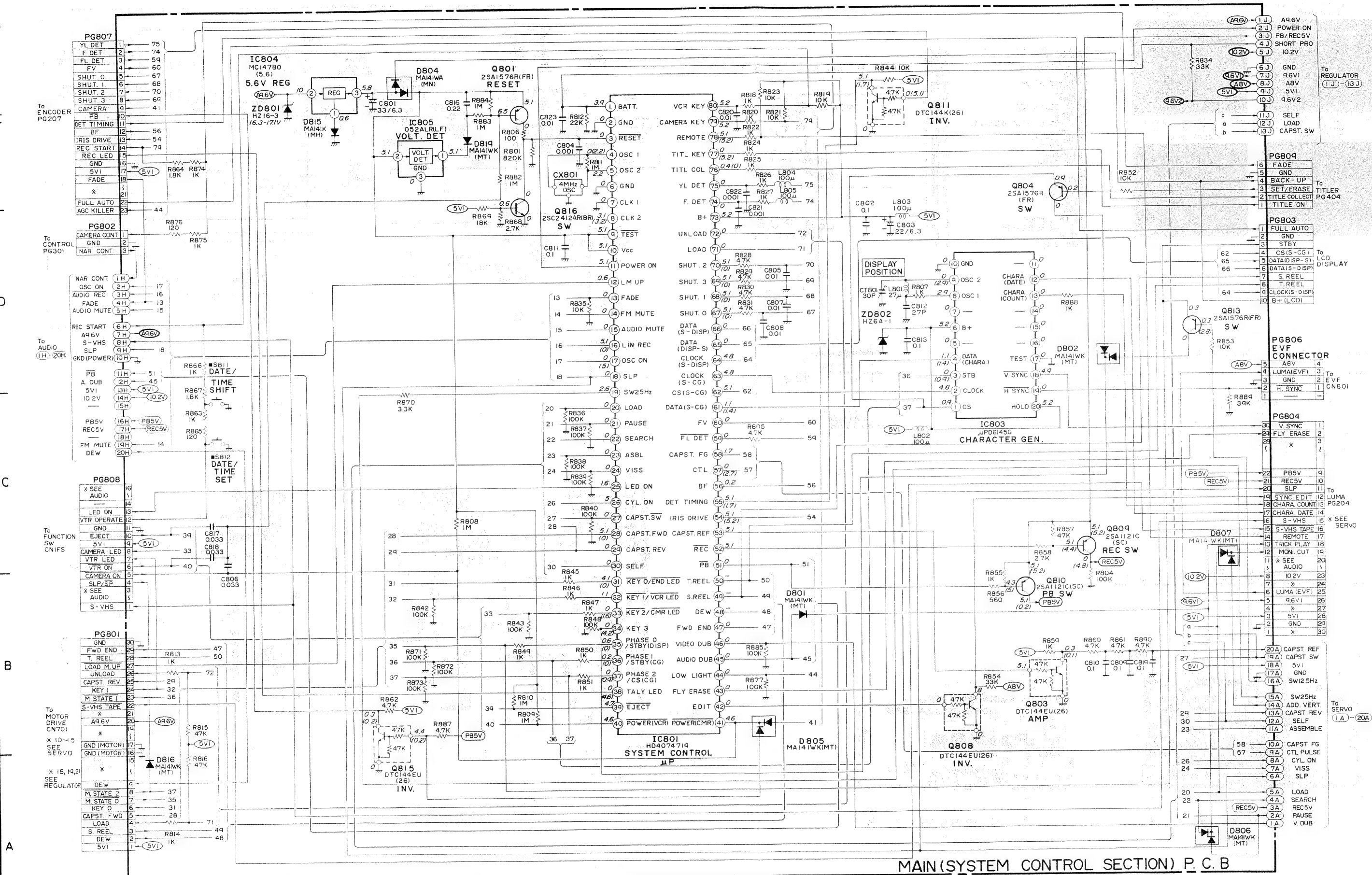
LED P.C.B (SOLDER SIDE)

■ : Soldered side
□ : Parts side
● : Through hole

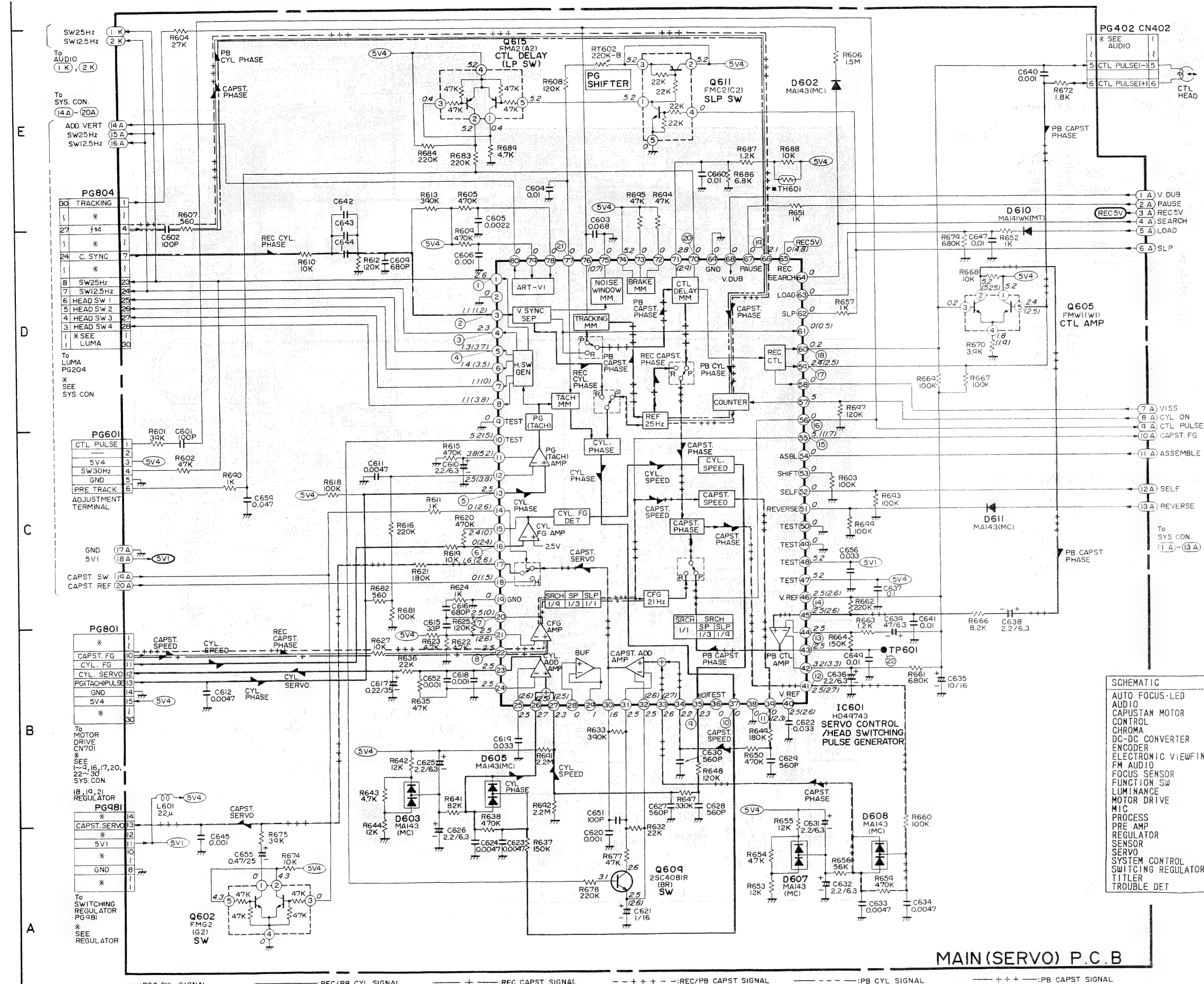
AUTO FOCUS CIRCUIT BOARD



MAIN (SYSTEM CONTROL SECTION) SCHEMATIC



MAIN (SERVO SECTION) SCHEMATIC



1-A	IC601-1	5.0Vp-p	1V/10.0msec.cm	REC/PLAY
2-A	IC601-3	3.5Vp-p	1V/5.0msec.cm	REC/PLAY
3-A	IC601-4	4.8Vp-p	1V/10.0msec.cm	REC/PLAY
4-A	IC601-5	5.2Vp-p	1V/10.0msec.cm	REC
4-B	IC601-5	5.4Vp-p	1V/10.0msec.cm	PLAY
5-A	IC601-13	100mVp-p	50mV/5.0msec.cm	REC/PLAY
6-A	IC601-16	4.0Vp-p	1V/500μsec.cm	REC/PLAY
7-A	IC601-20	5.2Vp-p	1V/100μsec.cm	REC/PLAY
8-A	IC601-22	2.0Vp-p	0.5V/200μsec.cm	REC/PLAY
9-A	IC601-35	1.3Vp-p	0.3V/20.0μsec.cm	REC/PLAY
10-A	IC601-37	1.3Vp-p	0.5V/20.0μsec.cm	REC/PLAY
11-A	IC601-39	1.3Vp-p	0.3V/20.0μsec.cm	REC/PLAY
12-A	IC601-41	1.3Vp-p	0.5V/50.0μsec.cm	REC/PLAY
13-A	IC601-43	2.5Vp-p	0.5V/10.0msec.cm	REC

MAIN CIRCUIT BOARD - SOLDER SIDE -

: Soldered side
 : Parts side
 : Through hole

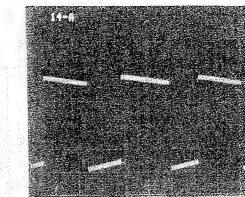
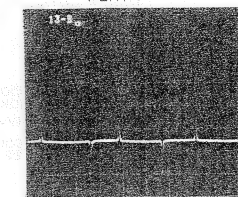
NOTE: MARK "■" IS DISCRETE COMPONENT.
 : MARK "⊙" IS LEADLESS (CHIP) JUMPER.

MAIN P.C.B
 (SOLDER SIDE)

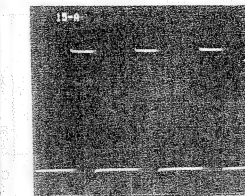
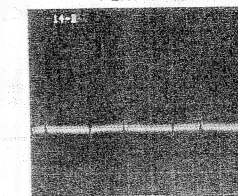
FX P.C.B

EX P.C.B

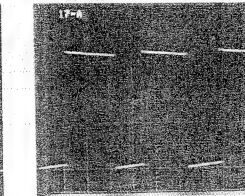
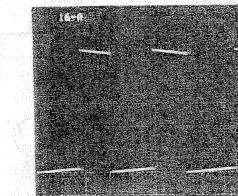
13-B IC601-43 3.8Up-p 1U/10.0msec.cm
 14-A IC601-45 850mUp-p 0.2U/10.0msec.cm
 PLAY REC



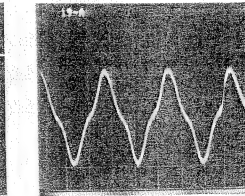
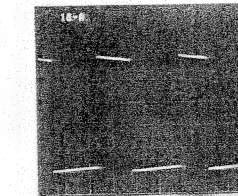
14-B IC601-45 200mUp-p 50mU/10.0msec.cm
 15-A IC601-55 5.3Up-p 1U/500μ sec.cm
 PLAY REC/PLAY



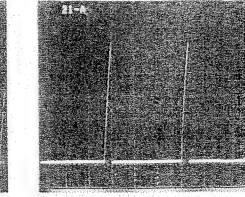
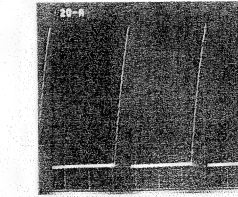
16-A IC601-56 5.3Up-p 1U/10.0msec.cm
 17-A IC601-59 5.1Up-p 1U/10.0msec.cm
 REC/PLAY REC



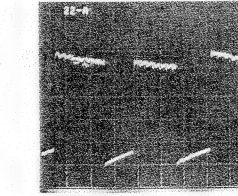
18-A IC601-60 5.1Up-p 1U/10.0msec.cm
 19-A IC601-66 420mUp-p 0.1U/100nsec.cm
 REC REC/PLAY



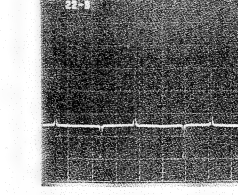
20-A IC601-70 3.1Up-p 0.5U/10.0msec.cm
 21-A IC601-77 2.7Up-p 0.5U/5.0msec.cm
 REC/PLAY REC/PLAY



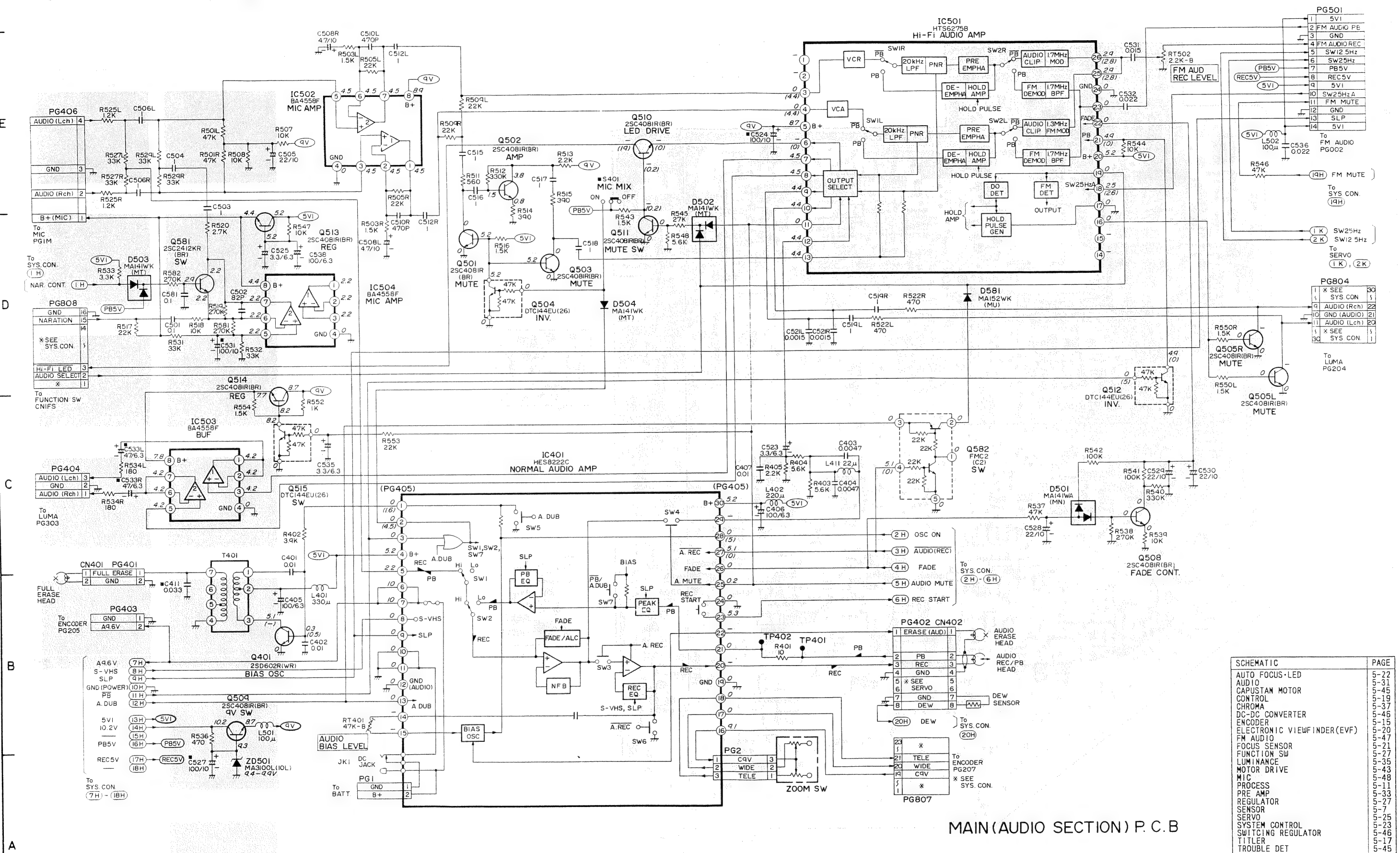
22-A TP601 2.5Up-p 0.5U/10.0msec.cm
 REC



22-B TP601 3.8Up-p 1U/10.0msec.cm
 PLAY



MAIN (AUDIO SECTION) SCHEMATIC

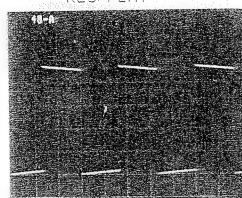


MAIN (AUDIO SECTION) P.C.B

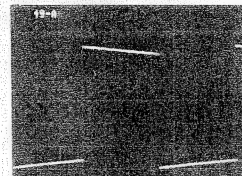
SCHEMATIC	PAGE
AUTO FOCUS-LED	5-22
AUDIO	5-31
CAPUSTAN MOTOR	5-45
CONTROL	5-19
CHROMA	5-37
DC-DC CONVERTER	5-46
ENCODER	5-15
ELECTRONIC VIEWFINDER(EVF)	5-20
FM AUDIO	5-47
FOCUS SENSOR	5-21
FUNCTION SW	5-27
LUMINANCE	5-35
MOTOR DRIVE	5-43
MIC	5-48
PROCESS	5-11
PRE AMP	5-33
REGULATOR	5-27
SENSOR	5-7
SERVO	5-25
SYSTEM CONTROL	5-23
SWITCHING REGULATOR	5-46
TITLER	5-17
TROUBLE DET	5-45

PRE AMP SCHEMATIC

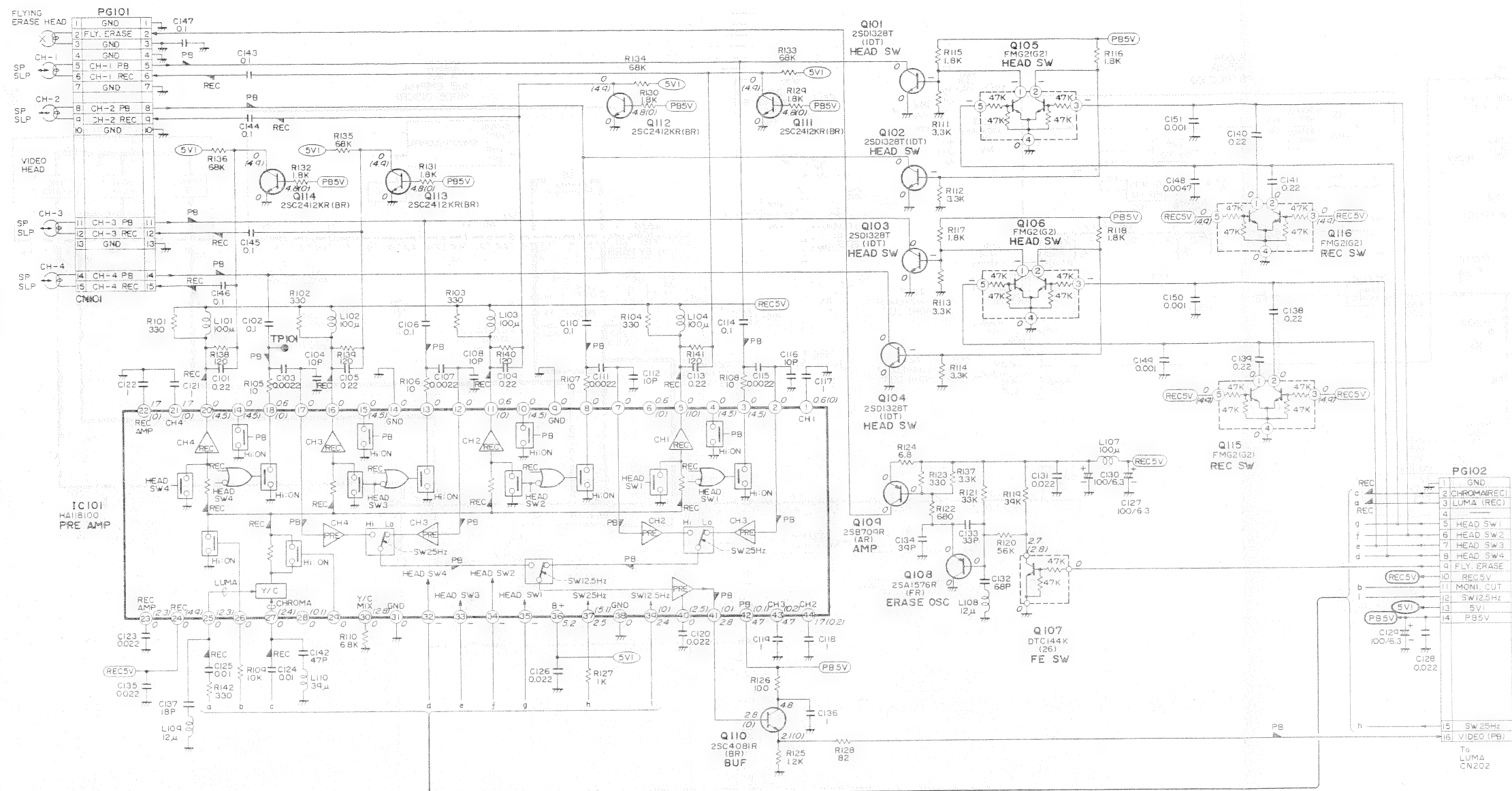
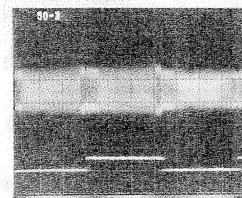
48-A IC101-37 4.8Up-p
1V/10.0msec.cm
REC/PLAY



49-A IC101-39 5.3Up-p
1V/10.0msec.cm
REC/PLAY

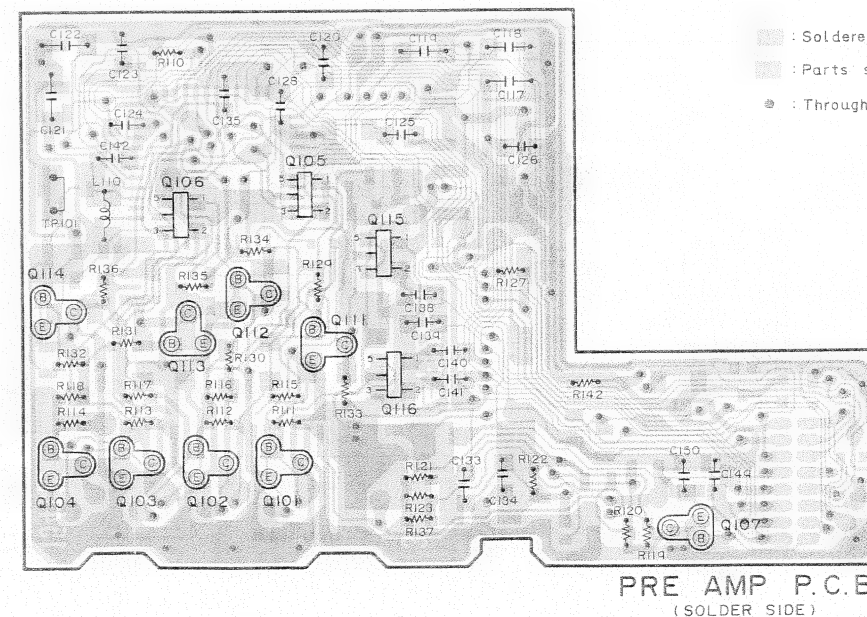
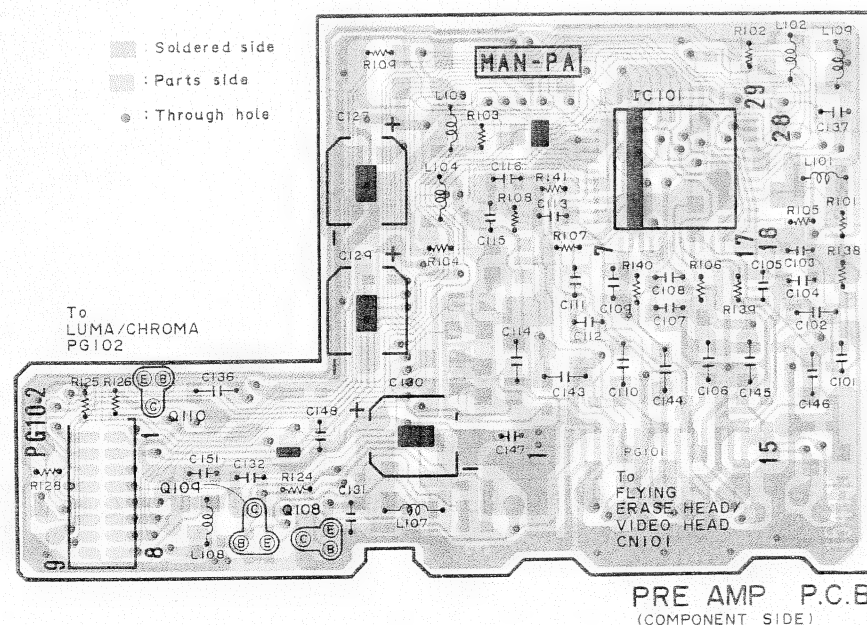


50-B IC101-41 590mUp-p
0.2V/5.0msec.cm
PLAY



PRE AMP CIRCUIT BOARD

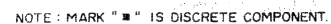
PRE AMP P.C.B



- Soldered side
- Parts side
- Through hole

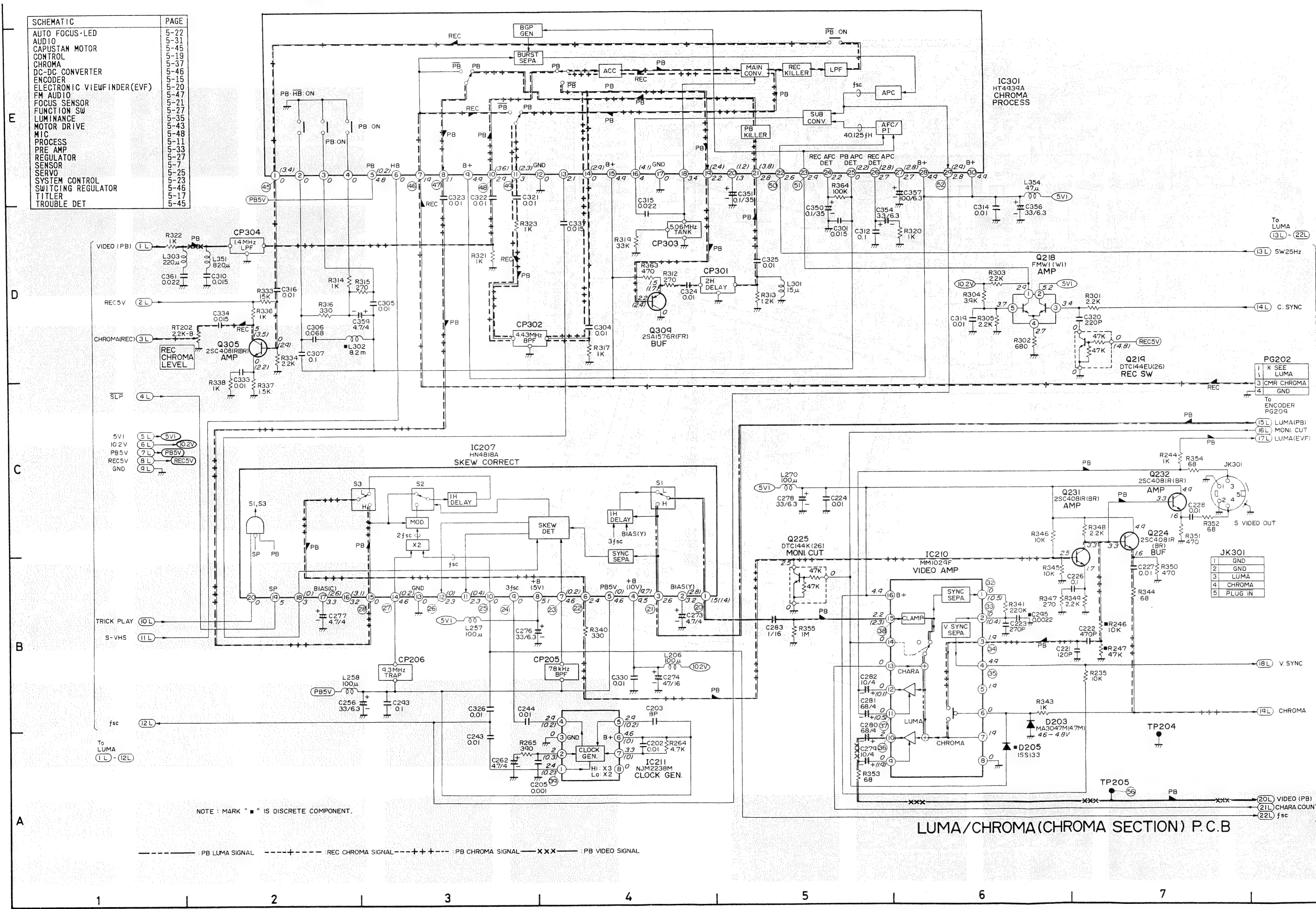
SCHEMATIC	PAGE
AUTO FOCUS-LED	5-22
AUDIO	5-21
CAPSTAN MOTOR	5-19
CONTROL	5-17
CHROMA	5-16
DC-DC CONVERTER	5-15
ENCODER	5-14
ELECTRONIC VIEWFINDER(EVF)	5-13
FM AUDIO	5-12
FOCUS SENSOR	5-11
FUNCTION SW	5-10
LUMINANCE	5-9
MOTOR DRIVE	5-8
MIC	5-7
PROCESS	5-6
PRE AMP	5-5
REGULATOR	5-4
SENSOR	5-3
SERVO	5-2
SYSTEM CONTROL	5-1
SWITCHING REGULATOR	5-1
TITLER	5-1
TROUBLE DET	5-1

14



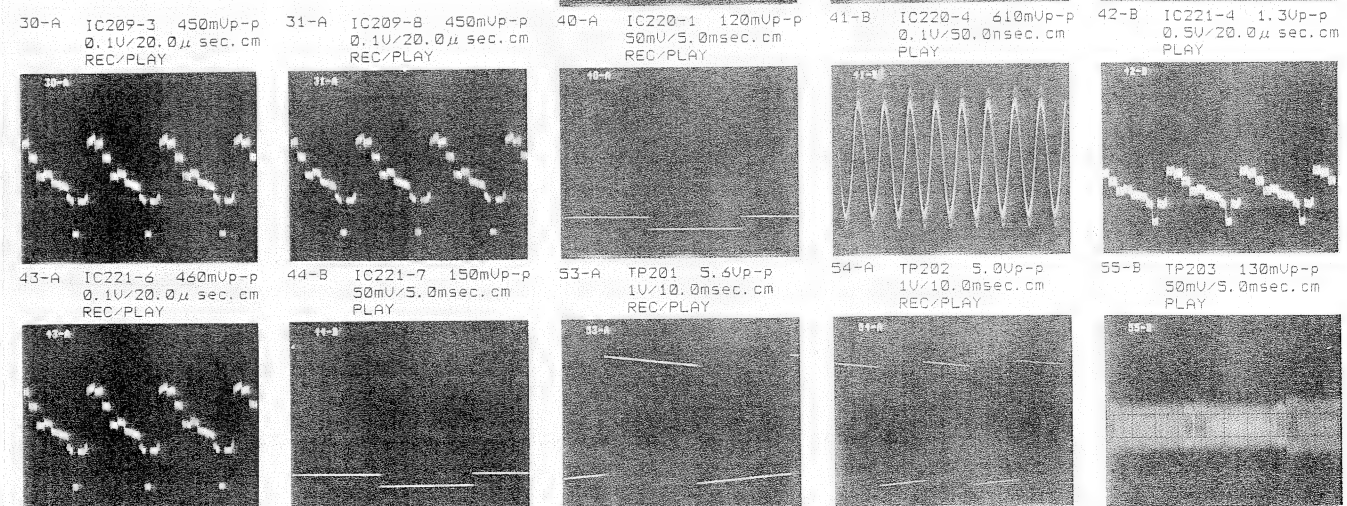
5-36 LUMINANCE

LUMINANCE/CHROMA (CHROMA SECTION) SCHEMATIC





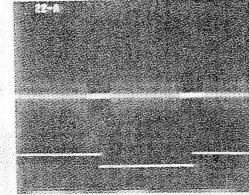
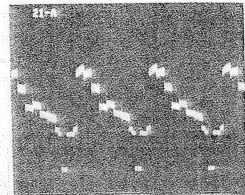
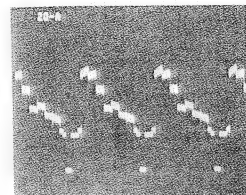
NOTE: MARK "■" IS DISCRETE COMPONENT.
: MARK "Ⓢ" IS LEADLESS (CHIP) JUMPER.



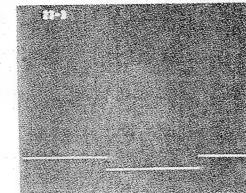
20-A IC207-1 940mUp-p
0.2V/20.0μ sec. cm
REC/PLAY

21-A IC207-3 900mUp-p
0.2V/20.0μ sec. cm
REC/PLAY

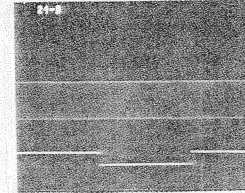
22-A IC207-6 410mUp-p
0.2V/5.0msec. cm
REC/PLAY



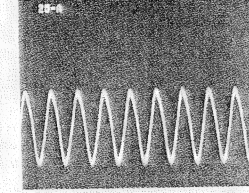
23-B IC207-7 210mUp-p
0.1V/5.0msec. cm
PLAY



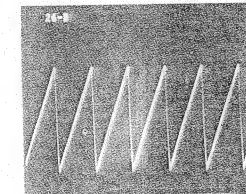
24-B IC207-7 870mUp-p
0.5V/5.0msec. cm
PLAY



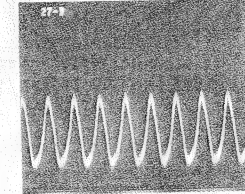
25-A IC207-10 320mUp-p
0.1V/200nsec. cm
REC/PLAY



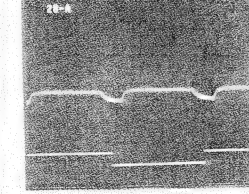
26-B IC207-12 2.3Vp-p
0.5V/20.0μ sec. cm
PLAY



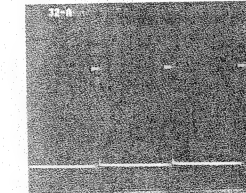
27-B IC207-14 160mUp-p
50mV/200nsec. cm
PLAY



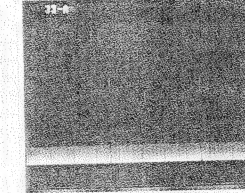
28-A IC207-15 450mUp-p
0.2V/5.0msec. cm
REC/PLAY



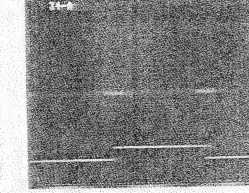
32-A IC210-1 4.4Vp-p
1V/20.0μ sec. cm
REC/PLAY



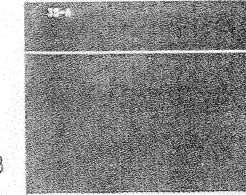
33-A IC210-2 3.9Vp-p
1V/5.0msec. cm
REC/PLAY



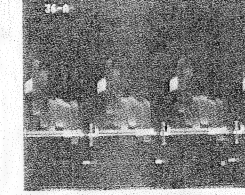
34-A IC210-3 210mUp-p
0.1V/5.0msec. cm
REC/PLAY



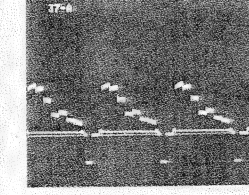
35-A IC210-4 5.0Vp-p
1V/5.0msec. cm
REC/PLAY



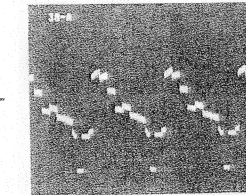
36-A IC210-10 2.4Vp-p
0.5V/20.0μ sec. cm
PLAY



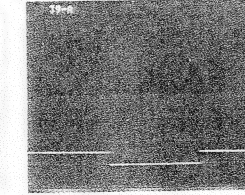
37-A IC210-11 1.8Vp-p
0.5V/20.0μ sec. cm
REC/PLAY



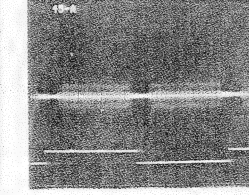
38-A IC210-15 900mUp-p
0.2V/20.0μ sec. cm
REC/PLAY



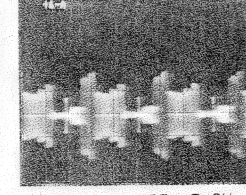
39-A IC211-1 300mUp-p
0.1V/5.0msec. cm
REC/PLAY



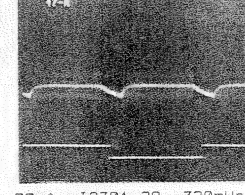
45-A IC301-1 410mUp-p
0.2V/5.0msec. cm
REC



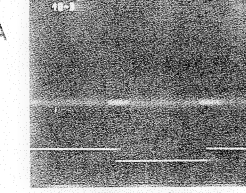
46-A IC301-7 780mUp-p
0.2V/20.0μ sec. cm
REC



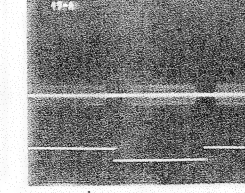
47-A IC301-8 430mUp-p
0.2V/5.0msec. cm
REC/PLAY



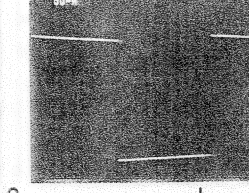
48-B IC301-10 54mUp-p
50mV/5.0msec. cm
PLAY



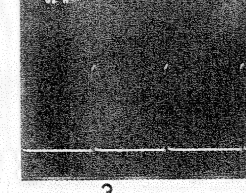
49-A IC301-11 810mUp-p
0.5V/5.0msec. cm
REC/PLAY



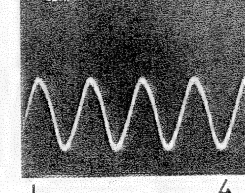
50-A IC301-22 5.0Vp-p
1V/5.0msec. cm
REC/PLAY



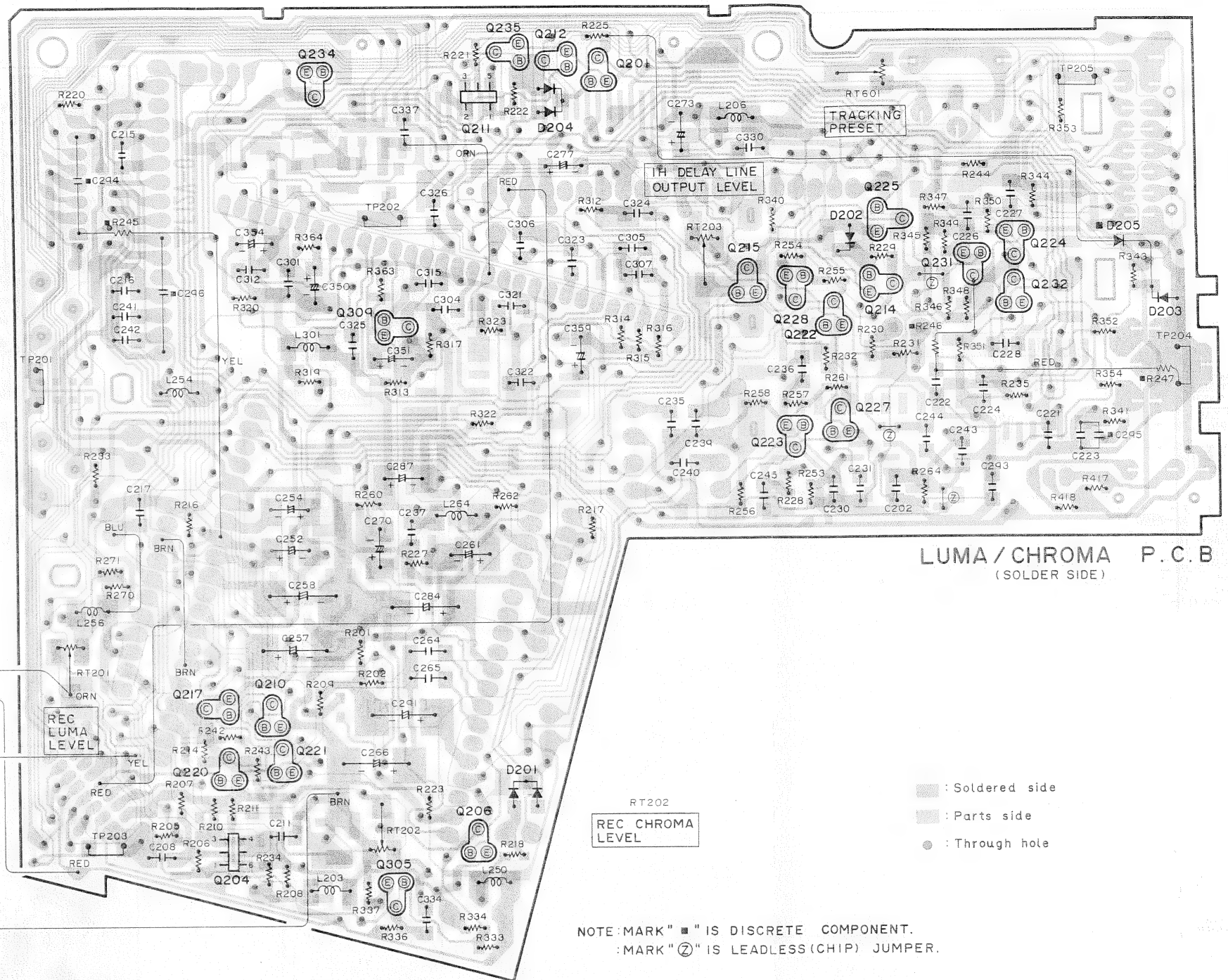
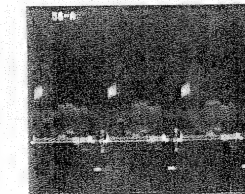
51-A IC301-23 7.8Vp-p
2V/20.0μ sec. cm
REC/PLAY



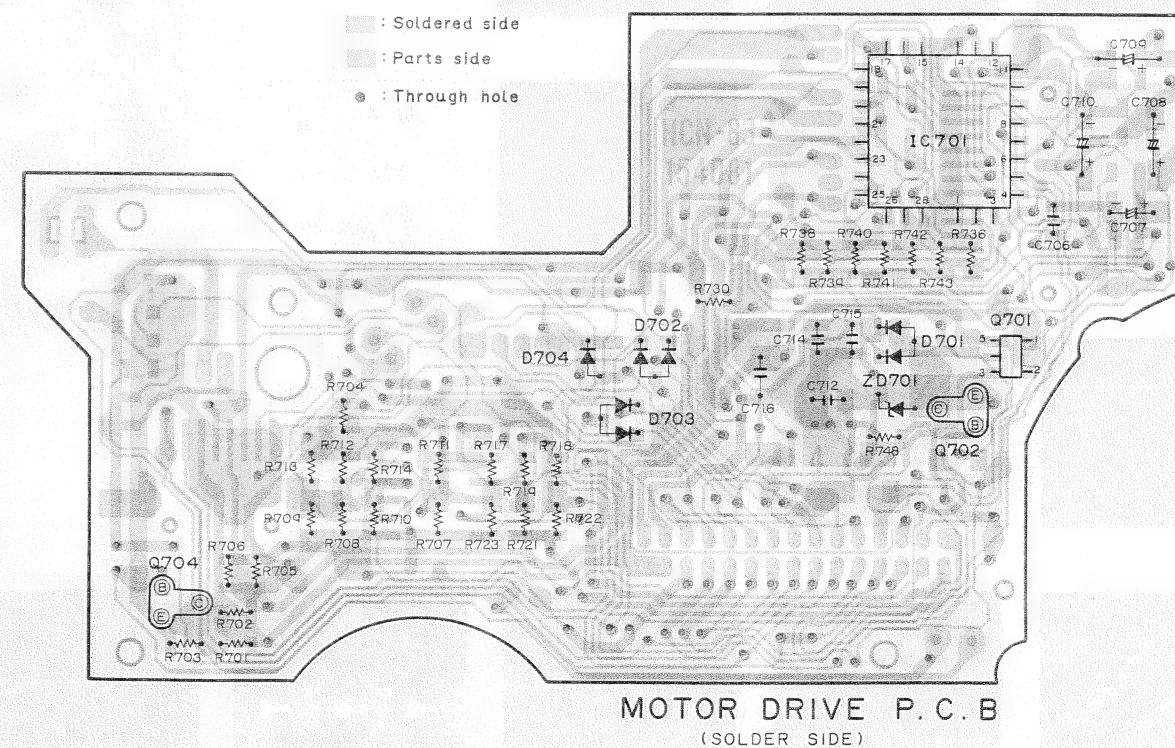
52-A IC301-29 320mUp-p
0.1V/100nsec. cm
REC/PLAY



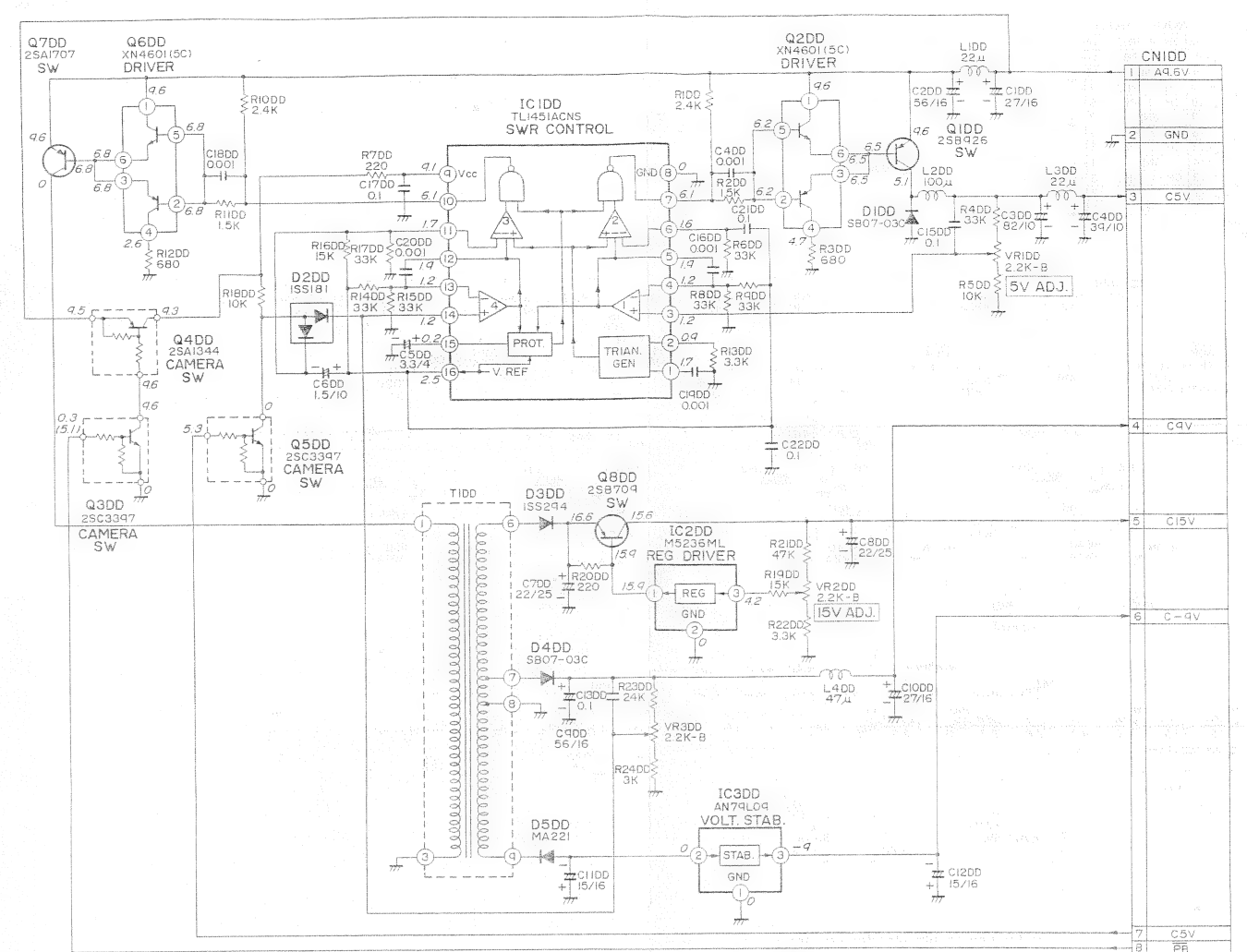
56-A TP205 2.4Vp-p
0.5V/20.0μ sec. cm
REC/PLAY



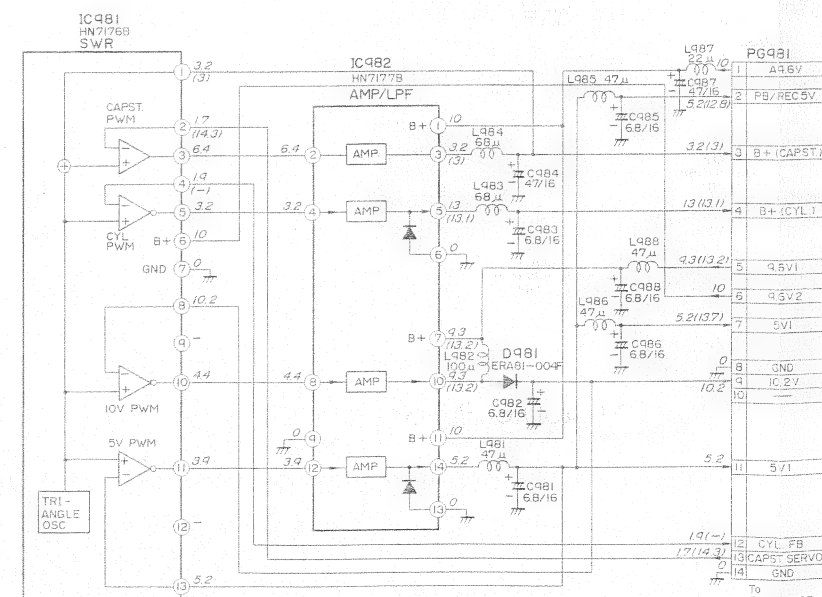
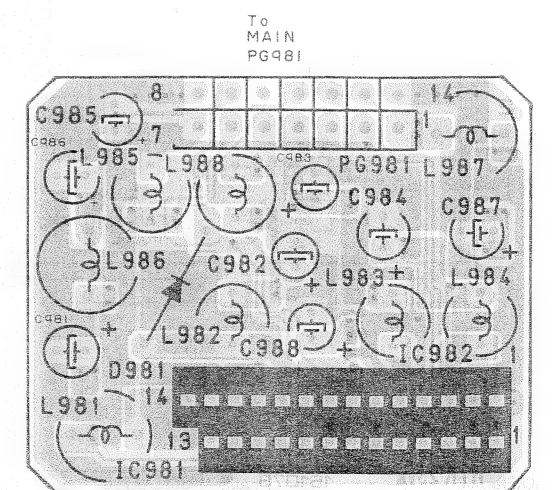
MOTOR DRIVE CIRCUIT BOARD

5-44 MOTOR DRIVE



DC-DC CONVERTER SCHEMATIC (Reference)

ENCODER
G206

SWITCHING REGULATOR SCHEMATIC

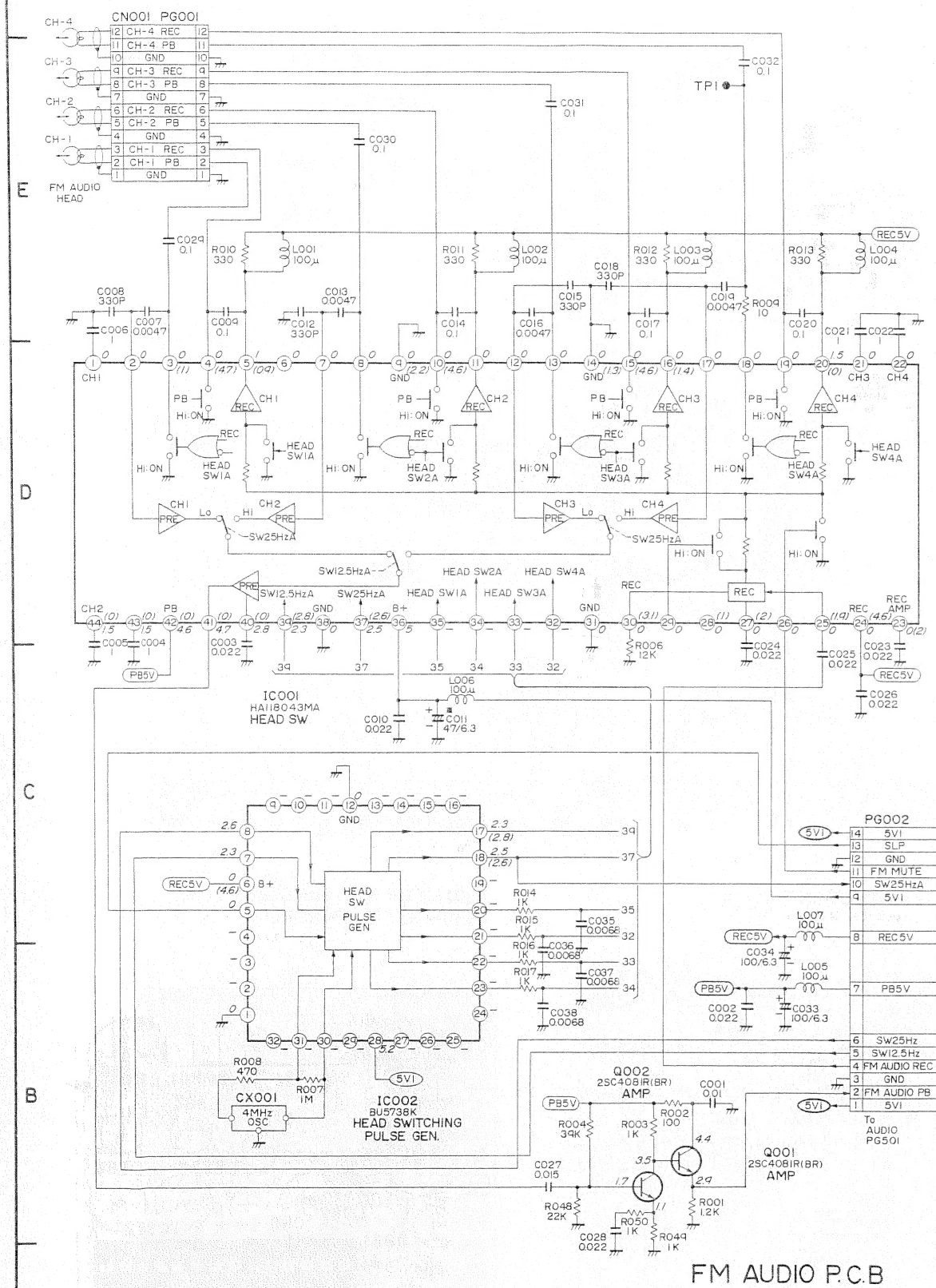
SWITCHING REGULATOR
CIRCUIT BOARD

SWITCHING REGULATOR P.C.B.
(COMPONENT SIDE)

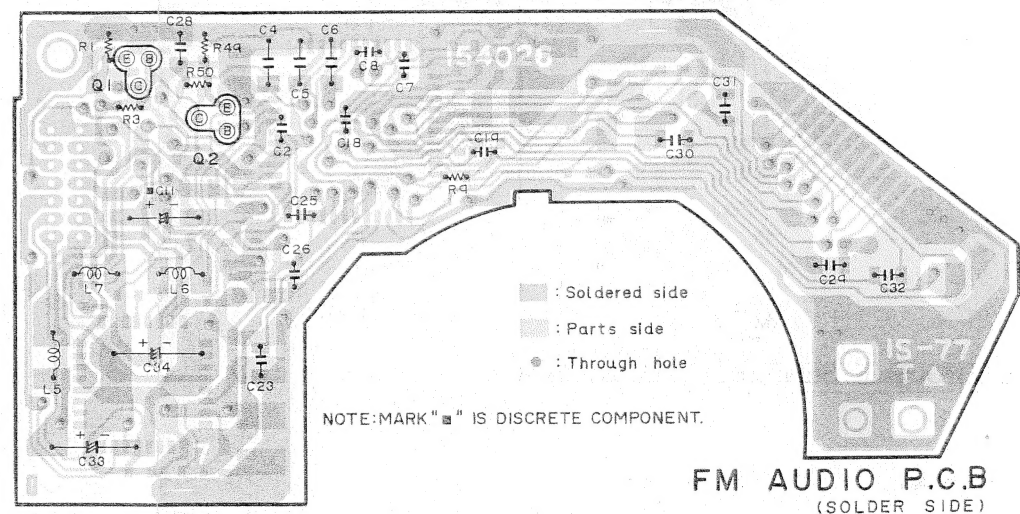
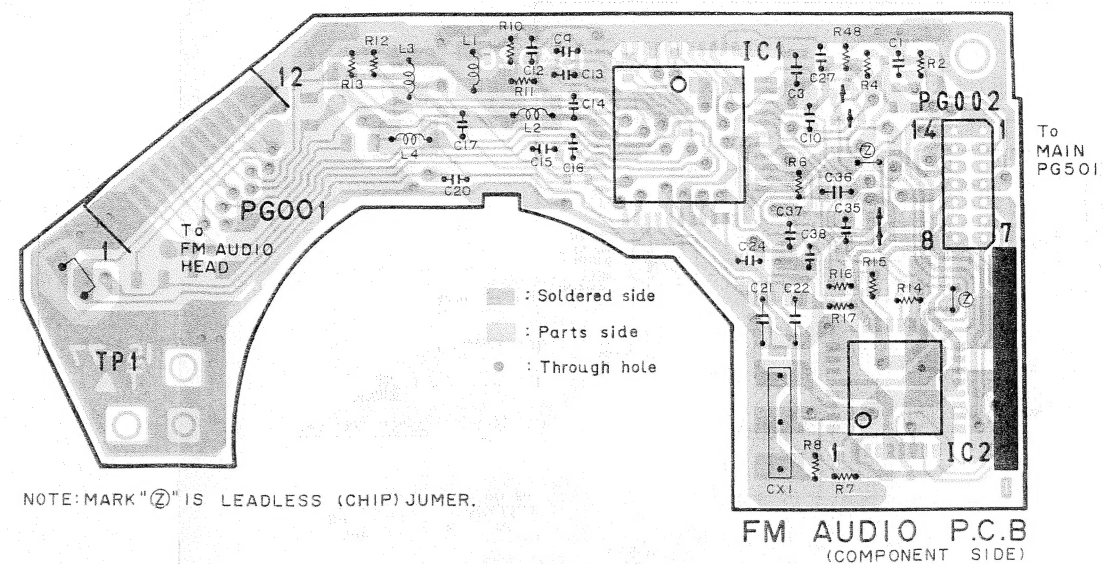
-  : Soldered side
-  : Parts side
- : Through hole

SCHEMATIC	PAGE
AUTO FOCUS-LED	5-22
AUDIO	5-31
CAPASTAN MOTOR	5-45
CONTROL	5-19
CHROMA	5-37
DC-DC CONVERTER	5-46
ENCODER	5-15
ELECTRONIC VIEWFINDER(EVF)	5-20
FM AUDIO	5-47
FOCUS SENSOR	5-21
FUNCTION SW	5-27
LUMINANCE	5-35
MOTOR DRIVE	5-43
MIC	5-48
PROCESS	5-11
PRE AMP	5-33
REGULATOR	5-27
SENSOR	5-7
SERVO	5-25
SYSTEM CONTROL	5-23
SWITCHING REGULATOR	5-46
TITLE	5-17
TROUBLE DET	5-45

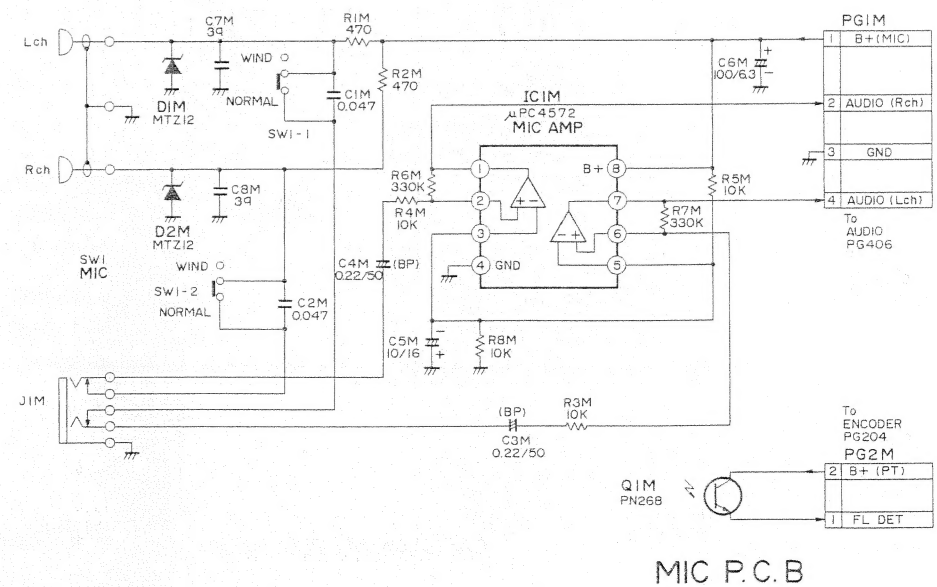
FM AUDIO SCHEMATIC



FM AUDIO CIRCUIT BOARD

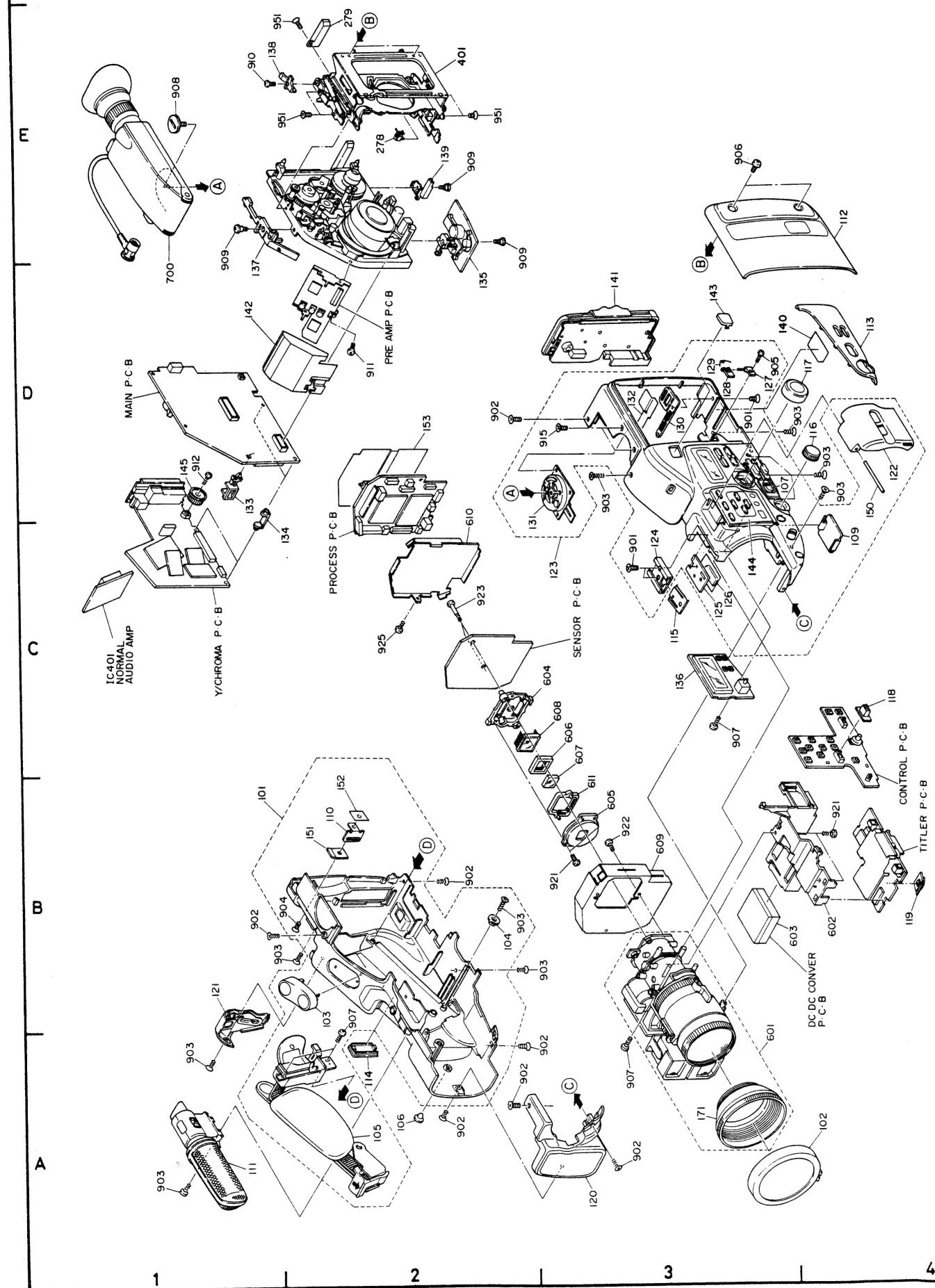


MIC SCHEMATIC (Reference)



SCHEMATIC	PAGE	SCHEMATIC	PAGE
AUTO FOCUS-LED	5-22	MOTOR DRIVE	5-43
AUDIO	5-31	MIC	5-48
CAPUSTAN MOTOR	5-45	PROCESS	5-11
CONTROL	5-19	PRE AMP	5-33
CHROMA	5-37	REGULATOR	5-27
DC-DC CONVERTER	5-46	SENSOR	5-25
ENCODER	5-15	SERVO	5-23
ELECTRONIC VIEWFINDER(EVF)	5-20	SYSTEM CONTROL	5-23
FM AUDIO	5-47	SWITCHING REGULATOR	5-46
FOCUS SENSOR	5-21	TITLER	5-17
FUNCTION SW	5-27	TROUBLE DET	5-45
LUMINANCE	5-35		

CHAPTER 6 EXPLODED VIEW - CABINET SECTION



-LUBRICATION

Lubrication points are shown in the exploded view diagrams by marks

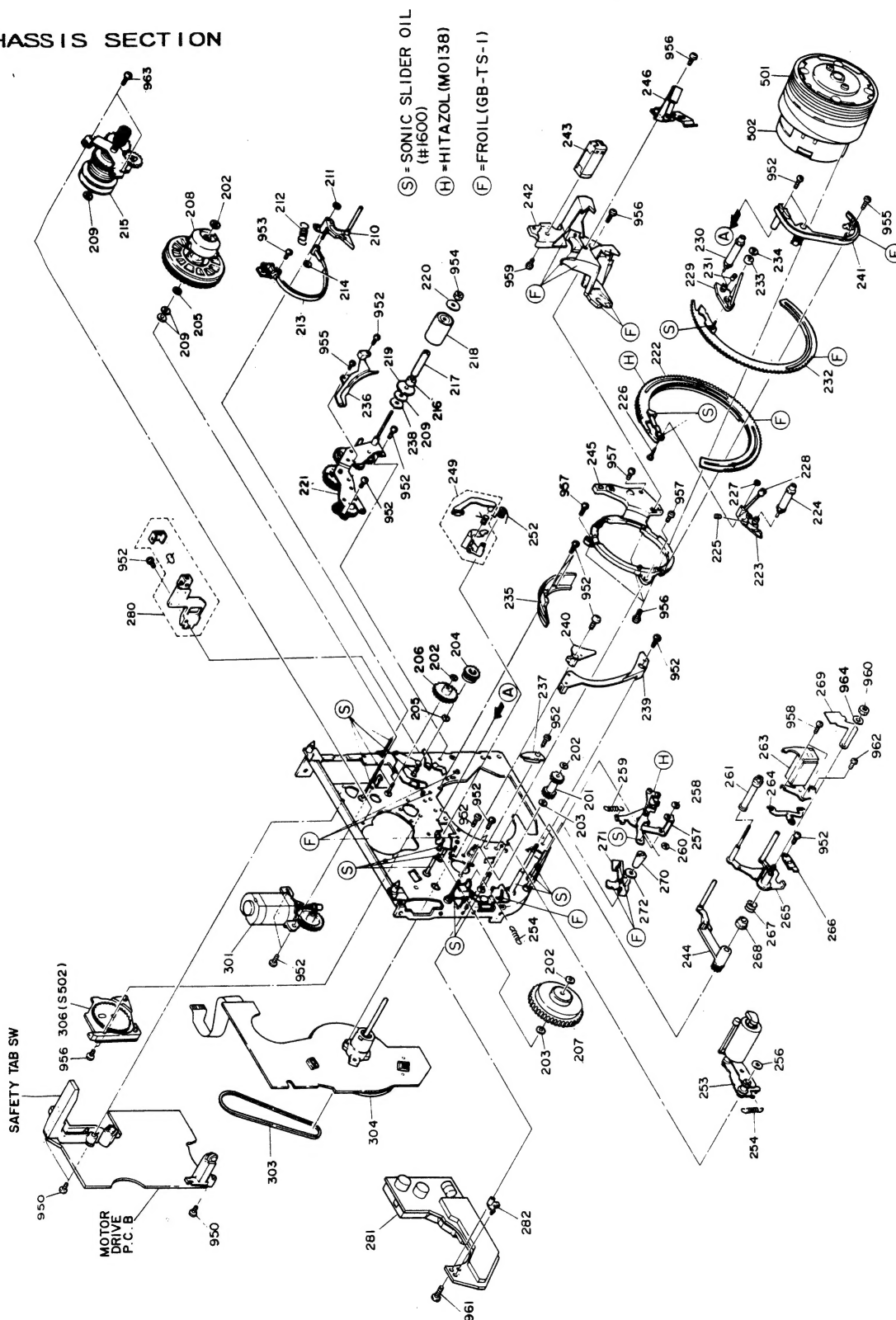
(S), (H).

Lubricants shown in the diagram are as follows.

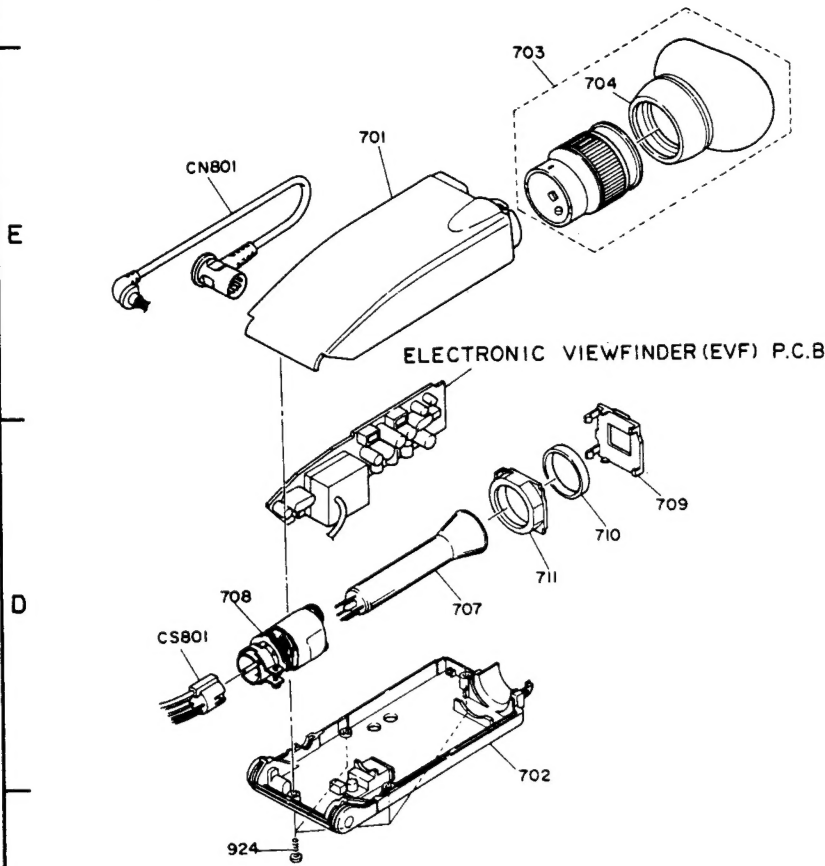
(S) Sonic slider oil (#1600)

(H) Hitazol (MO-138)

-CHASSIS SECTION



- ELECTRONIC VIEWFINDER (EVF)



- LENS SECTION SECTION

